ILLUSTRATED

ELECTRICAL REVIEW

A Journal of Scientific and Electrical Progress.

VOL. 26. No. 7. WEEKLY.

NEW YORK, WEDNESDAY, FEBRUARY 13, 1895.

$3 per Annum. Single Copies, 10 Cents.

Copyright, 1895, by ELECTRICAL REVIEW PUBLISHING COMPANY, 13 Park Row, New York.

Entered at Post Office, New York, as Mail Matter of the Second Class.

VIEWS, NEWS AND INTERVIEWS.

"A friend of mine invented a very ingenious gas appliance and wanted to test it in my office," remarked a Wall street broker. "I discovered that there was no gas in my building and we had to inquire in buildings over two blocks down Wall street before we found a gas burner in working order. The incandescent lamp has made great progress, surely."

Mr. Nikola Tesla is generally regarded as an unusually modest man, and one who doesn't go in for ostentatious display. This was exemplified at the time the New York *World* printed an interview with him, written by Arthur Brisbane and accompanied by that truly marvelous picture of Tesla, showing him standing erect with lightning flashes glancing out from every portion of his body. Mr. Tesla had gone to a well-known health resort for a brief vacation a few days prior to the publication of the interview. He had been at the hotel just long enough to make a few acquaintances, and to become pretty well known himself. On the Sunday that the interview was published, the papers containing it reached the hotel at 10 o'clock. Mr. Tesla, in walking about the hotel lobby, observed many people who glanced at a paper in their hands, then looked up at him with an expression of awe, and finally put their heads together and discussed something in whispers. He finally discovered the cause to be that wonderful picture. At 11 o'clock Sunday morning Mr. Tesla was on the first train bound for New York.

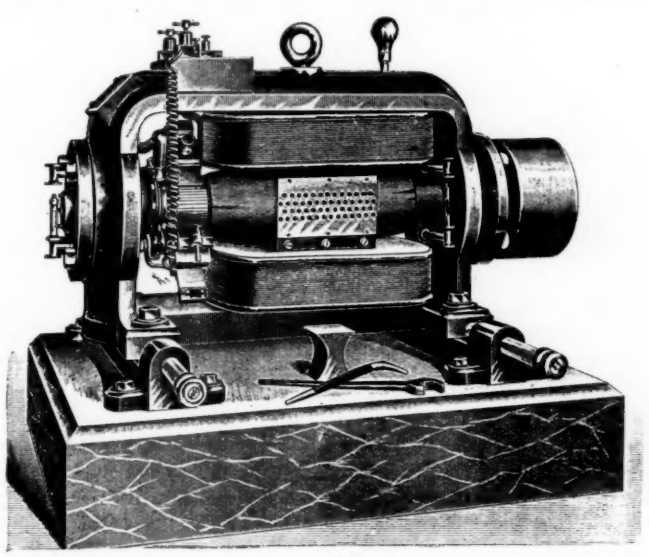
The telephonic communication between Berlin and Vienna, which was opened on December 1, has not met with expectations. The sounds are almost inaudible and Vienna papers claim to be able to prove that the trouble lies in the defective instruments used in Berlin.

At a recent meeting of the German Electro-Chemical Society, Mr. Werner Bolton exhibited a number of incandescent lamps in which aluminium had been used for the leading-in wires instead of platinum. The co-efficients of expansion by heat of aluminium and glass being very different, special means have to be adopted to secure a tight joint. The plan adopted is as follows: A wire of aluminium is placed in a glass tube and heated until both it and the glass fuse. The aluminium core and its glass jacket thus produced are allowed to cool, when the latter cracks, but this is of no importance, as the object of this jacket is simply to prevent the aluminium melting when it is being soldered on to the thick envelope which is to form the base of the lamp. This having been done and the filament fixed, the bulbs are exhausted, a drop of a strong solution of mercuric chloride having been previously placed on the outer ends of the leading-in wires. As the vacuum is formed in the bulb, this solution is drawn in past the aluminium wires. These latter then first become amalgamated and then oxidized and the alumina thus formed is said to lute up the wires perfectly air-tight.

In response to resolution the railroad commission reports the increase of capital stock by railroads in New York State since 1883. The total increase by electric and horse roads was $34,930,000; steam roads, $22,321,700; elevated roads, $14,740,200; total, $78,991,900.

The Lindner Dynamo.

The illustration presented herewith is from London *Industries and Iron* and shows the Lindner dynamo, made by the Elektro-Mekaniska Aktiebolage Norden, of Stockholm, Sweden. This machine embodies several differences in design from the usual dynamo type. It will be seen that there are no special brackets, etc., for supporting the bearings, which are supported in cylindrical openings in the frame itself. The whole of the iron in the frame, therefore, is utilized to form the magnetic system, thus performing a two-fold duty. The lubrication is entirely automatic, and is effected by a device which allows oil to flow from receivers in the body of the cylinder in which the bearings are fixed, and the same oil is continually used until its lubricating properties are exhausted. The quantity and quality of the oil can be inspected at any time by means of gauge glasses, and renewal is usually required only once a fortnight. These dynamos are made either series, shunt or compound wound. It is claimed that there is no sparking at the commutator, and that the brushes require practically no shifting for any load.



THE LINDNER DYNAMO.

A bill has been introduced in the Illinois Legislature reducing telephone charges to maximum of $78 and minimum of $36 per year.

ELECTRIC LIGHT CONVENTION.

Cleveland to be Filled with Advocates of Light, February 19-21.

A GOOD ATTENDANCE IS PROMISED—CONSIDERABLE ENTHUSIASM OVER THE TRIP—DELEGATIONS GOING FROM ALL ALONG THE LINE—AN INTERESTING AND VALUABLE PROGRAMME.

As the time for holding the Cleveland Convention of the National Electric Light Association draws near more enthusiasm in the meeting is shown. If you have forgotten the date—which isn't probable—here it is: February 19, 20 and 21.

A number of small parties in cities off the route of the special train, leaving New York at 9.30 A. M., Monday, February 18, have been formed and they will either catch the train on the way or go to Cleveland independently. Senator Fred. W. Royce, of Washington, will lead a party of delegates which will flank the Philadelphia cohorts going over the Pennsylvania road at Harrisburg. The Chicago party promises to be a large one and expects to travel in a special car.

Master of Transportation C. O. Baker, Jr., has issued the following circular letter:

The various passenger associations have granted the rate of a fare and one-third for the round trip, on the certificate plan, from all points east of Chicago, Burlington, Peoria and the Mississippi River to Cleveland. Ask the ticket agent from whom you purchase your ticket for a delegate's certificate to the National Electric Light Meeting, which, when properly filled in and indorsed, at the association headquarters in Cleveland, will entitle you to return for one-third the regular fare.

A special vestibuled train, composed of parlor cars, will leave via the N. Y. C. & H. R. R. R. at Grand Central Station, New York, at 9.30 A. M., Monday, February 18. Leave Albany at 1 P. M.; Utica, 3.17; Syra-

cuse, 4.40; Rochester, 6,30; Buffalo, 7.25 (Central time); Erie, 9.33; arriving at Cleveland at 11.55 P. M.

Seats for this train can be procured from the undersigned at the following rates:

From New York and Albany to Cleveland			$3.00
From Utica	to Cleveland		2.25
" Syracuse	"	"	2.00
" Rochester	"	"	1.50
" Buffalo	"	"	1.00

The passage rate from New York to Cleveland is $13; rate returning, with certificate properly indorsed, $4.35.

As the Wagner Parlor Car Company decline to charter their cars, it makes it necessary for us to pay the full rate for the entire space; therefore it is very important that the applications for space should be made at the earliest possible moment.

The following is the official programme of the Cleveland Convention in full:

TUESDAY, FEBRUARY 19, 1895.

Meeting of the Executive Committee—9 A. M., Parlor 138, Hollenden Hotel.
Morning Convention Session—10.30 o'clock, Army and Navy Hall.
Address of Welcome—By Mayor of Cleveland.
President Francisco's Address.
Paper by N. W. Perry—"The Storage of Energy Essential to Central Station Economy: How it May Be Accomplished and the Economies Resulting."
Discussion—John W. Langley, W. M. Stine, M. J. Perry.
Report of Committee on Relations Between Manufacturing and Central Station Companies—Frederic Nicholls, chairman.
Afternoon Session—2 o'clock.
Paper by E. J. Houston and A. E. Kennelly—"A New Method of Measuring Illumination."
Discussion—W. A. Anthony, C. D. Haskins, W. S. Howell, Edward Weston, L. Stieringer.
Report of Committee on Data—H. M. Swetland, chairman.
Discussion—W. R. Gardener, E. L. Powers, H. W. Sexton.
Paper by Walter E. Harrington—"Correct Method of Protecting Electric Circuits."
Questions and Answers—"What Is It You Wish to Know?"
Executive Session.

WEDNESDAY, FEBRUARY 20.

Morning Session—10 o'clock.
Paper by Edward Weston—"Some Economies in Electric Light and Power Stations."
Paper by C. N. Black—"Large Arc Dynamos."
Discussion—S. M. Hamill, J. J. Wood, F. W. Rollins, E. R. Weeks.
Topic—"How to Light Large Cities."
Discussion—Frederic Nicholls, Geo. A. Redman, Jas. I. Ayer, E. F. Peck, C. R. Huntley, Robert Lindsay, F. H. Clark, T. C. Smith, J. F. Morrison.
Report of Committee on Finance—John A. Seely, chairman.
Questions and Answers—"What Is It You Wish to Know?"
Executive Session.
Afternoon Session—2.30 o'clock.
Paper by E. A. Leslie—"The Operation of High Tension Currents Underground from a Physical and Financial Standpoint."
Discussion—H. J. Smith, W. H. Browne, C. H. Wilmerding, John A. Seely, C. L. Edgar.
Paper by L. B. Marks—"Arc Carbons and the Rating of Arc Lamps."
Topic—"Incandescent Lighting *vs.* Other Methods."
Discussion—H. T. Edgar, E. F. Philips, W. S. Barstow, E. A. Armstrong, J. Gwynne, B. P. Holmes.
Questions and Answers—"What Is It You Wish to Know?"
Executive Session.
Evening Session—8 o'clock.
Topic by A. J. Wurts—"Practical Demonstrations of Protecting Lines from Lightning."

THURSDAY, FEBRUARY 21.

Morning Session—10 o'clock.
Paper by Dr. Louis Bell—"The Monocyclic System."
Discussion—A. E. Kennelly, L. B. Stillwell, J. F. Kelly.
Report of Committee on Rules for Safe Wiring—Wm. J. Hammer, chairman.
Topic—"Underwriters' Rules *vs.* National Electric Light Association Rules."
Discussion—Wm. Brophy, C. J. H. Woodbury, J. J. Burleigh, A. W. Field.
Afternoon Session—2.30 o'clock.
Executive Session.
Report of Secretary and Treasurer.
Executive Committee
Election of Officers

Mayor Robert Blee, of Cleveland, and Mr. James M. Hoyt, the Chauncey Depew of Cleveland, will deliver addresses of welcome to the visiting delegates.

Below appears a partial list of the passengers on the special train that leaves New York over the New York Central Road at 9.30 A. M. Monday, February 18. Additional applications for parlor seats are constantly coming to the office of the Association at 136 Liberty street, New York city: Jas. P. McQuaide, John A. Seely, I. H. Francisco, Don Francisco, A. J. Purinton, Edward Weston, E. W. Little, E. H. Johnson, G. M. Phelps, F. A. Scheffler, P. L. McLaren, F. W. Harrington, S. L. Coles, Cecil P. Poole, R. O. Heinrich, Chas. D. Shain, A. E. Bakewell, T. C. Martin, A. J. Martin, W. F. Osborn, Mr. and Mrs. A. J. Belden, Mr. and Mrs. H. J. Smith, Mr. and Mrs. E. F. Peck, Mr. and Mrs. W. J. Johnston, Mr. and Mrs. Jos. Sachs, Mr. and Mrs. C. O. Baker, Jr., Mr. and Mrs. M. J. Francisco, Mr. and Mrs. C. H. McIntire, Mr. and Mrs. F. S. De Ronde.

OBITUARY.

Col. Franklin A. Seely, formerly chief clerk of the Patent Office, and later examiner of trade marks, died at Washington, D. C., on February 6.

Sheldon Reynolds, aged 50 years, one of the best known citizens of Wilkesbarre, Pa., and president of the Wilkesbarre Electric Light Company, died on February 9 at Saranac Lake, N. Y., where he had gone to obtain relief from pulmonary troubles.

Dr. J. C. Dittrich, chemist and electrician of the Ozone Manufacturing Company, of New York, was a passenger on the ill-fated "Elbe" and was one of those who were lost in the terrible catastrophe. Dr. Dittrich was a German, 33 years old, and had lived in this country about four years. He was unmarried. He possessed a fine education and had made a great reputation for himself in his special line of work. He contributed several articles on the manufacture of ozone to the ELECTRICAL REVIEW. Dr. Dittrich had been summoned to Europe by a cablegram on account of his mother's illness. He was on his way home when he lost his life.

A fishing smack found Dr. Dittrich's body at sea on February 8 and brought it into Lowestoft, England.

Mr. Eugene L. Maxwell, of the house of Manning, Maxwell & Moore, died suddenly of apoplexy early Sunday morning last, at his residence in Brooklyn. Mr. Maxwell was widely and popularly known, was a brother of President J. Rogers Maxwell, of the Jersey Central Railroad, and with his partners had built up to its present magnitude the great manufacturing and supply house bearing his name. A beautiful home, probably the finest in all Brooklyn, had just been completed by Mr. Maxwell on Prospect slope, and the family had enjoyed living there but a brief period when this terrible bereavement came. There existed a regard and confidence between Mr. Charles A. Moore, of the firm, and Mr. Maxwell that makes the blow as terrible to Mr. Moore as though he were a member of the grief-stricken family. Mr. Maxwell and family had arranged to go to Europe next month.

Auction Sale of American Bell Stock.

R. L. Day & Company, of Boston, sold at auction on February 9, by order of the board of directors, the 3,368 shares of the American Bell Telephone Company's stock not taken by stockholders under the recent offer of treasury stock. The first bid was 185 and the first sale was at 191 when 761 shares were sold. The next sale was at 190 and the third at 190⅛. This left 1,748 shares to be disposed of which were sold at 189¼. The last lot is said to have been bought for a pool of investment buyers.

ELECTRIC LIGHT FLASHES.

Mexico, Mo., wants electric lights.

Elizabethtown, Pa., will soon have electric lights.

California, Mo., is feeling proud of its new electric lights.

The Biloxi, Miss., Electric Light Company recently declared a 10 per cent dividend.

A test of the Detroit, Mich., municipal electric lighting plant will be made about March 1.

The Kettle River will probably be dammed at Sandstone, Minn., to furnish power for an electric light plant.

The Danville, N. Y., electric light plant has been sold on a mortgage foreclosure for $8,000, subject to a mortgage of $10,000.

The courts recently decided that bonds issued by the city of Marceline, Ia., for the purpose of constructing an electric light plant, were void.

St. Louis capitalists have purchased the Guthrie, Oklahoma, electric light plant. They will add more incandescent lights and put in an all-night circuit.

The General Electric Company has bought in the Chattanooga Electric Light Company's plant for $75,000. The company has a bonded debt of $145,000.

A syndicate, in which Logan M. Bullitt and Thomas Robb, of Philadelphia, are said to be interested, proposes building an electric lighting plant at Cape May, N. J.

The International Trust Company, of Boston, has foreclosed a mortgage on the property of the Leicester, Mass., Electric Light Company. The property will be sold at auction on March 15.

There is considerable discussion in Philadelphia over the fact that the city spends $2,030,481 a year for gas and electric lights while New York pays $936,500; Boston, $545,245; and Chicago, $842,200.

After a long controversy the city of Springfield, Mo., and the lighting companies have failed to agree on a renewal of franchises, and on February 2 all gas and electric street lights were cut off, the city being left in total darkness.

The report that the General Electric Company will move its Harrison, N. J., lamp factory to Lynn is said to be incorrect. The company is concentrating its repairing at Lynn, but has no thought of removing its lamp factory.

The landlords of the Exchange Hotel at Reading, Pa., have asked for an injunction to restrain the Metropolitan Electric Company from operating its four large engines in the plant adjoining the hotel. It is claimed that the vibration of the engines "causes the occupants of the hotel to have sick headaches."

Nicholas Ennis last week secured a verdict for $7,500 damages against the receiver of the Thomson-Houston Electric Company, of New York city, from a jury in the Supreme Court. Ennis was severely injured by contact with the company's wires, and sued for $50,000 damages. Justice Patterson pronounced the verdict excessive and said he would set it aside unless Ennis accepted $5,000. Ennis' attorney said he would probably do so.

A Boston syndicate has obtained control of the Edison Electric Illuminating Company, of Brockton, Mass. Alfred A. Glazier, treasurer of the Brockton Street Railway Company, has been elected president. The new board of directors is composed of the president and Edwin S. Webster, of Boston, Warren A. Reed, John P. Morse and Horace B. Rogers, of Brockton. The entire plant is to be improved at once and brought up to a more modern standard.

A new mode of lighting has been introduced by Mr. Lester Betts, the manager of the Calcutta branch of the Oriental Telephone and Electrical Company, Limited, in the case of the Empress of India Cotton Mills, at Budge-Budge, India, which are entirely lighted from the outside, special zinc fittings with 50 candle-power lamps being fitted to each window. This system, which has proved a complete success, saves the extra premium for fire insurance.

The Brenham Compress, Oil and Manufacturing Company, of Brenham, Texas, have just added a new 1,000 Wood alternator to their electric light plant, and now have a capacity of 1,750 sixteen candle-power incandescents and 30 arc lights. They have 1,200 incandescents and 22 arcs installed, and have only been shut down a few hours in two years. Their Russell engines have been running three years without any expense for repairs. Mr. Charles H. Eddy is the efficient superintendent of this company's electrical department.

The Brooklyn, N. Y., Aldermanic Committee on Gas and Electricity on February 1 considered bids from several companies for contracts for lighting the streets and public buildings. Only electric light bids were taken up. These came from the Edison, Municipal and Citizens' electric lighting companies, all of which bid 40 cents each per night for arc lights of 1,200 candle-power. The Edison company asked eight-tenth cents per hour for each incandescent light of 16 candle-power measured by its own meter. The two other companies bid for incandescent lights 20 cents each per 1,000 watts. The Edison company's bid for this class of lights is the lowest by 20 per cent. City Works Commissioner White said the city expended for the last 11 months for electric lighting $260,423, and for gas $183,181. In January, 1894, there were 1,887 electric lights and in December, 1894, 2,190 lights of 1,200 candle-power, also 52 lights of 600 candle-power. The contract for 1894 transferred 491 lights from other companies to the Edison company.

ELECTRIC RAILWAY NOTES.

Officers of electric railway companies are requested to send promptly to the ELECTRICAL REVIEW *notices of meetings, election of officers, declarations of dividends, financial reports and all items of interest in connection with the financial and practical operation of their roads.*

Chicago is to have electric railway mail cars.

The elevated road at Sioux City, Ia., will be sold at sheriff's sale on February 23.

It is expected the electric road from Cortland to Homer, N. Y., will be in operation next week.

Action on the street railway franchise at Sheboygan, Wis., has been deferred until July.

Cape Town, South Africa, is to have a municipal electric street railway to cost $500,000.

Lancaster, Pa., proposes to tax electric railway companies $2,000 a year for occupying the streets.

New Haven, Conn., motormen have petitioned the electric roads to inclose the forward platforms, to protect them from severe weather.

There are 824 miles of electric surface railways in operation in Massachusetts and they carried 220,464,099 passengers during the year 1894.

In the New York State Assembly a bill has been introduced submitting to all municipalities the question of municipal ownership of street railways.

The proposed electric street railway in Brattleboro, Vt., is meeting with opposition on the part of some of the citizens, among them ex Governor Fuller.

President J. D. Callery, of the Second Avenue Pittsburgh Traction Company, expects the new electric line to McKeesport, Pa., will be in operation by April 15.

Wesley Wentworth, formerly connected with street railway companies in Haverhill and Malden, Mass., has been appointed superintendent of the Lowell and Suburban Street Railway Company.

In addition to 140 new open cars recently ordered the West End Street Railway Company, of Boston, has ordered 52 more to take the place of the cars destroyed in the Columbus avenue fire.

The work of grading the new electric railroad between Saginaw and Bay City, Mich., will begin in the early Spring. The fare for a round trip will be 25 cents. Cars capable of holding 72 people will be run.

The Ottawa, Ill., electric street railway has been sold to a local syndicate by the General Electric Company for $40,000 in bonds, the local company to expend $20,000 in improvements. The transfer will take place March 1.

A number of minor accidents on several trolley lines were reported last week. The principal cause was that the unusually cold weather benumbed the motormen's hands so that they were unable to control their cars quickly.

After boring 2,000 feet and spending $10,000 the Philadelphia Traction Company has been unable to get an artesian well water supply at its power house, Thirteenth and Mt. Vernon streets, and the effort has been abandoned.

A decree has been entered ordering the sale in March of the Queen City Electric Street Railroad at Marion, Ind. The decree was entered upon the suit of the Metropolitan Trust Company, of New York, and the judgment was for $79,551.88.

A bill was recently introduced in the New York State Assembly providing that no charter shall hereafter be granted to any street railway that does not furnish bonds relieving the municipalities from any suit for damages to the railroad's property.

A bill has been introduced in the New York State Assembly providing that in all cities with a population of over 200,000 the street car companies shall be compelled to heat their passenger cars during the months of November, December, January, February and March.

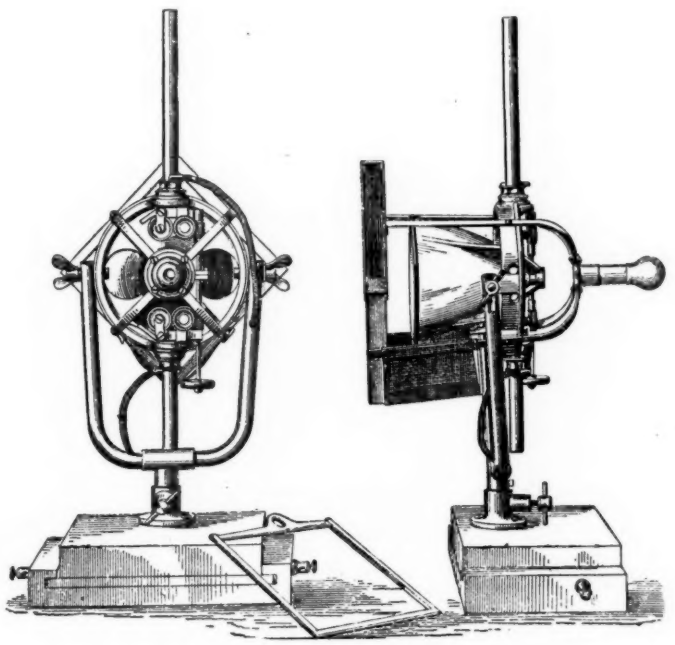
To Minnesota belongs the honor of first introducing and adopting the humane law to provide a vestibule for the protection of motormen on trolley cars in Winter. Ohio was a good second and now New York, Wisconsin, Michigan, Indiana and Colorado have under consideration similar bills.

The Gettysburg, Pa., Electric Railway has been sold to J. Luttrell Murphy, of Chicago, and Walter B. Kendall and John A. Connelly, of Philadelphia, for $250,000. The purchasers obligate themselves to complete the road to the Maryland line, there to connect with the Maryland system of trolley roads.

The National Street Railway Association proposes to introduce in the Common Council of each city and legislature of each State in which it has organizations ordinances and bills requiring street car corporations to furnish protection to their motormen, gripmen, drivers or others who may be intrusted with the movement of the cars and the lives of the passengers.

A trolley car loaded with passengers ran into an open draw on the Russell avenue line of the Milwaukee, Wis., Street Railway line on February 4, at the Kinnickinnic Bridge. The passengers were all thrown into the icy water. Two women and the motorman were taken out drowned. Eight other passengers were injured. The accident was due to the carelessness of the motorman, who allowed the car to approach too near the open draw, and paid the penalty of his carelessness with his life. The thick ice in the river alone prevented greater loss of life, as the car was only submerged two-thirds of its length, endwise, in the river.

Judge Parker has handed down a decision in the case of the Kingston City Electric Railway Company, which vacates the injunction forbidding the Colonial company to lay its tracks on Broadway, Kingston, N. Y., between Cedar and Thomas streets, which was granted a year ago by Judge Herrick, on the ground that the laying of a track at that point would be in violation of the general street surface railroad law of New York State. Judge Parker holds that in running diagonally along Broadway, from Cedar street to Thomas, the line will not be paralleling the track of the Kingston City road, and that to do this the consent of the plaintiff is not necessary. On this ground principally he vacates the injunction. It is understood the case will be appealed. The Colonial road is being operated in two sections, the injunctions of the Kingston City road and the West Shore Railroad having prevented the operation of the road as a whole. The Colonial company proposes to escape the West Shore injunction by tunneling under that company's tracks.



THE CRYPTO HAND-FEED STAGE ARC LAMP.

His First Ride On a Trolley Car.

Ees ver' strange the way those ca', they go, them. Yo' see they got one li'l' corde w'at are ver' strong, an' they pass that li'l' string or pole, five feet on top the ca', yes. An' they go, close pole nail' on the top of the ca', an' they got one li'l' w'eel screw' on the top that close pole, by w'ich they hang those ca' on those rope. An' thass a ver' good h'idea, yes, fo' kip the ca' on the track. Bot me, I don't on'stan' 'ow that one li'l' string ees so strong fo' sopport the weight of that ca' w'at ees hang h'all the time on that corde, it.

An' they got one li'l' botton by the seat, w'ich w'en yo' 'ave the desire fo' stop the ca', yo' push those botton, an' at the same time that h'action stick a pin in the back of that moverman, by w'ich he is h'inf'o'm ees time fo' stop. An' the way he stop that ca', ess a revelation, yes. He turn one crank, him, an' that pull the li'l' w'eel h'off the wire, an' the ca', she stop, quick, fo' the r-r-reason ees too heavy fo' roll fa' sur la terre. An' w'en ees time fo' go, the man, he turn those crank once mo', an' that place that li'l' w'eel back on the string, an' she go.

It tek h'only vigt-cinq minute fo' pass by that abbatoir, mon cher Sylvestre, an' w'ile I think thass a good thing, still, at the same time, it mek yo' feel lak yo' ride too short fo' yo' pay, yes. An' w'en we return, I mek close h'observation of those moverman an' those conductor, them, an' I think to myself, that some of ou' parents w'at they drive mule on those cream-cheese line, they go'ne fine fin' theyse' ver' moch embarrass w'en they be h'oblige' fo' wear so moch clo'se, them, ef M'sieur Cougot, he h'insist on ees employés wear coat on those new h'electricity ca', yes.—*New Orleans Times-Democrat.*

The Crypto Hand-Feed Stage Arc Lamp.

The accompanying illustrations from the London *Electrician* show a back and side view, in elevation, of the Crypto hand-feed focusing arc lamp for stage illumination. This lamp is constructed to give about 500 candle-power, and works with a current of five amperes either on a continuous or alternating circuit. No attempt at automatic regulation has been made, as it is desirable that the attendants should not have the excuse for leaving their lamps which is afforded by an automatic arrangement. A single adjustment, however, actuates both carbons and keeps the arc in focus. The reflector is parabolic in shape, and is of copper; it is not silvered, as the silvering is not found to stand the intense light of the arc; but it may easily be whitewashed from time to time. Whiting is a very efficient reflector if kept quite clean. The handle at the back is for adjusting the direction of the rays of light, the lamp being mounted on a freely moving universal joint. This handle is hollow, to enable the operator quickly to extinguish the light by blowing out the arc. A set of colored glass slides in front of the reflector enables the various color effects to be produced. This lamp is now in use in many of the London and provincial theaters.

THE GAS MOTOR STREET CAR IN SERVICE.

A NEW CAR FOR THE UNITED STATES.

Mr. Frank H. Mason, United States Consul-General at Frankfort, Germany, has made the following report under date of November 30, 1894:

In two previous reports some account was given of a new method of propulsion for street and suburban railway cars, by means of a gas engine, as first applied and put in operation at Dresden, and subsequently introduced experimentally into Great Britain. The earliest models of this car were unduly heavy, complicated and expensive; but it has since been improved and simplified to a point of economy and efficiency which it is now thought may fairly challenge expert criticism. At the beginning of August last, four cars of the latest and most improved type were put into regular service upon a suburban railway leading from Dresden along a busy boulevard to the village of Wilden Mann, a distance of nearly three miles. These cars have since been in daily service from six o'clock in the morning until 10 at night, working side by side over part of the line with horse cars, with which the road was originally equipped, so that a close temporary comparison is offered between the two systems, operated under identical conditions.

With the exception of some slight modifications, designed to minimize the oscillation of the vehicle at the moment of starting or when at rest with the engine in motion, these cars are of the same general type as the one described in the last previous report as being in experimental service at Croydon, in England.

Outwardly, the car's appearance is precisely similar to that of an ordinary double-decked horse car, having stairways from each platform to the seats on the roof. All the machinery is enclosed and concealed from sight; there is no smell of gas, no noticeable heat from the engine and no undue noise or jar when the car is stopped or set in motion. The motor is a double cylindered gas engine of the Otto model, placed under the seat at one side of the car, and reached for purposes of oiling, cleaning or repairs by doors which form panels in the outer wall of the car, and when closed are not noticeable. The engine is of the latest type, in which the gas is ignited at each stroke by an electric spark from a small battery located in the engine space, so that the car is put into or out of service by turning a knob which opens or closes the circuit.

The engine is kept in motion while the car is in service, and the whole is managed by the driver, who, standing on the front platform, has within reach the brake wheel, on which is fixed the alarm bell and a movable lever which, when in an upright position, leaves the engine disconnected with the running gear of the car and cuts off the gas supply so that but one explosion takes place in one of the cylinders at each eighth revolution, the motion of the engine being meanwhile maintained and steadied by the fly wheel, which is four feet in diameter and of corresponding weight. When the lever is pushed to the left, it turns on a two-thirds supply of gas in both cylinders and brings into engagement a friction clutch, which connects the engine shaft with the wheel axles and gives the car a speed of four and one-half miles per hour. Pushing this lever to the right turns on the full gas supply and brings into connection a friction clutch of larger diameter, which gives the car a speed of nine miles per hour. A second lever is provided for reversing the engine and direction of movement.

The gas supply is carried in three cylindrical reservoirs of boiler iron, about 10 inches in diameter, two of which are hung transversely under the floor at each end of the car, while the third is placed beneath the seat at the side opposite the engine. The weight is thus to some degree equalized. The three reservoirs weigh, together, about 550 pounds, and contain 33.5 cubic feet of gas, condensed to a pressure of eight atmospheres by means of an ordinary force pump at the end supply station. This pump is worked by a gas engine of eight horse-power. The whole apparatus costs, in Germany, $2,380.

A fourth cylindrical reservoir, containing water for cooling the engine cylinders, is placed beneath the double seat along the middle of the deck roof, whence the cool water descends and the warm ascends automatically through concealed copper tubes so effectively that the water, being continually cooled in the exposed reservoir, is used over and over again, and keeps the cylinders down to the requisite temperature. The gas reservoirs are filled at the end station by means of a flexible hose leading from the condenser, and the filling process occupies from 30 seconds to a minute, according to the caliber of the hose and the degree to which the gas in the reservoirs has been previously exhausted.

The ordinary car is equipped with a gas engine of nine horse-power and carries 36 passengers; viz., 14 seated inside and 12 on deck, with platform standing room for 10 more. The car costs, in Germany, 12,000 marks ($2,856). When it is desirable to make the motor car capable of drawing a trailer during hours or days of increased travel, the engine is increased to 12 horse-power, and the car then costs, complete, $3,094. The work of the new motor cars, which have now been in service at Dresden during a period of three months, seems to have fulfilled substantially all that has been claimed in their favor. The car is perfectly manageable, stops from full speed within its own length, starts without noise or shock, is free from heat or smell, runs as smoothly as a horse-car on what would be considered in America a rather rough and poorly constructed track, far surpasses a horse-car in speed when the way is clear, and is handled safely and easily on a boulevard which, at certain hours, is crowded with traffic that renders frequent and sudden stops necessary. At the slower rate of speed it mounts a grade of one in 22, and traverses, uphill, a curve of 40 feet radius.

Exact and conclusive comparisons of net cost and operating expenses, as compared with other systems of propulsion, can, of course, be deduced only from prolonged and continuous service covering a period of years, but from the experience thus far gained, some of the essential factors of the problem may be closely approximated. Gas is furnished by the street gas company in Dresden at its usual rate, three cents per cubic meter, or about $1.05 per 1,000 cubic feet. At this price the cost for gas consumed by a car in service is one cent per car kilometer (one and three-fifths per car mile). The initial cost of a gas motor car does not differ much from that of a new horse car with its complement of horses. The gas reservoir station for a large line occupies but small space, and can be managed by one or two men, and the cars, when not in service, consume nothing and only require a shed for shelter from the weather. One cleaning per week is found to be sufficient for the machinery, which is tightly inclosed and protected from dust and dampness.

In Germany, good horses for tramway service cost from $200 to $250 each, and their average efficiency does not exceed three years, at the end of which time they are either worn out, or, if salable for breeding purposes or farm work, they bring only from one-fourth to one-half of their original cost. In Dresden, the annual depreciation of street railway horses from all causes—disease, accident and inevitable wear from hard service in all weathers on hard pavements—is reckoned at from 18 to 22 per cent of their value, and this percentage is said to be still higher in tropical or very cold countries, where only inferior breeds of draft horses are available and the conditions of animal life are less favorable.

The cost of keeping a gas motor car in repair, although not yet fully demonstrated for a long period, is estimated at not more than five per cent annually of its original cost, and with ordinary care such a car should last as long as two or three outfits of horses, which latter are, moreover, subject to epidemics and to conscription, in case of sudden war, for military service. So far, therefore, as experience has yet demonstrated, the mechanical efficiency of the gas motor car would seem to be assured; and a comparison of its cost of construction and operation with the known expense of working horse, cable, steam and electrical tramways in the United States can hardly fail to invest the new motor, as a competitor in the same field, with a serious practical interest. Further improvements will, no doubt, still better adapt it to its work under varying local conditions, but in its present form it would not seem to be well suited to lines which have grades more abrupt than 1 in 20, and it has not yet been proven to be well adapted to countries which are subject to frequent and heavy falls of snow.

In the latter of the two previous reports on this subject it was stated that a gas motor car of the most improved type was then under construction in England, and would be sent to the United States for trial and exhibition in October. In order to adapt the invention more fully to the peculiar requirements of our country, a second and entirely new model has been invented, with the result that the contemplated exhibition in the United States has been unavoidably postponed until some time in February.

The fact has been taken into account that in a country where sudden and frequent snowfalls occur in Winter, a motor of higher power is requisite, and that in order to meet more fully the wants of American tramway companies, the machine must be so modified as to be readily applied to cable, electrical and horse cars already in use, thereby economizing all but the running gear of such vehicles. The following modifications have therefore been made in the Dresden model as above described: The motor has been condensed in compass so as to be readily set upon a four-wheeled truck, wholly independent of the upper portion of the car. The flywheel and driving machinery are laid in a horizontal position between the wheels, and two sets of springs are provided, those supporting the machinery resting directly on the axles and those supporting the car body bearing on the truck frame, the two sets of springs being entirely independent of each other. By this clever device the vibration caused by the engine at the moment of starting is reduced to a minimum, and the whole apparatus so simplified that when the body of any ordinary street car is bolted to the springs and the cool water reservoir and its connecting pipes are attached, the car is ready for service. The motor has been increased from eight to 20 horse-power, and its maximum speed, with the larger friction clutch in engagement, to 12 miles an hour.

Thus, within less than a single year after having first been put in operation, the Lührig gas motor car has been so modified and improved as to constitute a practically new machine, in which all the mechanical and economic difficulties which were at first encountered seem to have been successfully overcome.

Water Power Development and Electric Transmission for Atlanta, Ga.

For several months past, negotiations have been in progress looking to the development of large water powers known to exist on the Chattahoochee River near the city of Atlanta, Ga. The matter has chiefly been carried forward by Mr. J. H. Vail, of New York city, and has now focalized in the organization of the Atlanta Electric Power Company, which concern will control an aggregate of about 30,000 horse-power, divided between two powers; one-half of the amount within nine miles of the city of Atlanta, and the remaining amount of 15,000 horse-power within 13 miles from the same city. Both powers are derived from the rapids and shoals of the Chattahoochee River. The first construction of dam and power house will be located on the property of Mr. A. E. Thornton, near Vinings Station, on the Western and Atlantic Railway. The surveys have been completed and the plans and specifications for the construction of the dam and power house and system of transmission are finished.

The principal parties interested are: James Swan, president of the Atlanta National Bank, Atlanta, Ga.; A. E. Thornton, vice-president Atlanta National Bank, Atlanta, Ga.; H. R. Garden, lawyer, of New York city; J. H. Vail, president of Electrical and Mechanical Engineering Company, of New York city; together with other prominent business men in the city of Atlanta, who are largely interested in the enterprise.

The entire construction has been placed in the hands of the Electrical and Mechanical Engineering Company, No. 39 Cortlandt street, New York city. Ground will be broken at an early date and the work pushed forward rapidly. The development of this power will have great influence on the future prosperity of the city of Atlanta, affording the highest modern development of electric transmission and the distribution of power for large manufacturing purposes, as well as for arc and incandescent lighting, heating and all allied industries. This project will be of lasting benefit to the city of Atlanta and to the South generally, and bids fair to make Atlanta the largest manufacturing center in the Southern States.

OUR BOSTON LETTER.

A location has been granted the Quincy and Boston Street Railway Company between East and South Weymouth. The Weymouth and Braintree road was also after the same privilege, but it was accorded to the former company from the fact that over $50,000 worth of stock in that company is held by the citizens of Weymouth.

The steam roads are evidently beginning to appreciate the importance of the traffic they are losing through the extension of the electric roads from town to town. Both the New York, New Haven and Hartford and New England roads have entered a vigorous protest against the construction of an electric line between New Britain and Berlin, and between New Britain and Hartford. The steam roads claim that they furnish sufficient means of transportation between these towns, and from prior constructions should be allowed an exclusive hold on the business. Those who have occasion to travel through this section, however, entertain very different views, and at a recent hearing, out of the 40 witnesses called, all testified to the need of electric roads.

It is gratifying to note that the West End company have at last made an effort in the direction of heating their cars. Quite a number have been equipped with electric heaters this Winter for the first time, and it is to be presumed that the remonstrance of the public in this matter of unheated cars is at last having its effect. Another innovation which promises to be of considerable convenience to passengers is a new method of notifying the conductor when to stop the car. This consists of a gong overhead on the rear platform connected with buttons attached to the framework of the window. In a crowded car when it is impossible to attract the conductor's attention (and Boston cars are generally in this condition), passengers by pressing this button can notify the conductor of their desire to alight. The system has already been tried and found entirely satisfactory, and in a few weeks about 300 of the cars will be thus equipped.

Notwithstanding the disastrous results of their conflict with the authorities regarding the crossing of their tracks by the Electric Street Railway in Abington last Summer, the New York, New Haven and Hartford Railroad Company endeavored to carry out a similar policy with the Morris Cove line in New Haven, Conn., but in this instance are using rather more caution in their mode of operation. The electric road has obtained an injunction from Judge Hotchkiss of the Court of Common Pleas, restraining the railroad company from interfering with their wires, but to make assurance doubly sure, have protected the wires with heavy beams, to prevent their being broken by the gates of the railroad company at the crossing. When the gates were first raised these beams effectually prevented them from doing any damage to the wires and, although the officers of the Consolidated road were advised to cut them, they wisely refrained from doing so. An extra force of police has been delegated at the crossing to prevent any trouble, but their services will probably not be required.

The most important and comprehensive electric railroad scheme ever conceived in this part of the country has just been brought to a head in Manchester, N. H., where a charter has been secured for the construction of a line, or series of lines, over 150 miles in length, and running from Salem, Mass., to the Canadian border. The capital stock of the company has been fixed at $1,000,000, and the incorporators are Chas. Corliss, B. F. Sherburne, E. H. Hoyt and D. B. Fuller. The company will be known as the Merrimac and St. Lawrence Railroad, and among the important places touched in its route will be Windham, Hudson, Nashua, Litchfield, Merrimac, Manchester, Concord, Canterbury, Alexandria, Bristol, and a number of other towns to the boundary line of the United States and Canada. A number of other important electric interests center at Manchester, whose capitalization amounts to nearly, if not quite, $2,000,000. While some of the projected roads may not materialize, there is no question that the coming year will see a tremendous development of electrical interests in this section. H. G. T.

Boston, February 9.

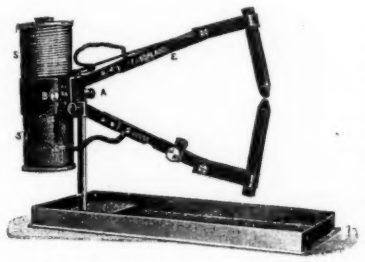


FIG. 1.—THE "DOT" ARC LAMP.

The "Dot" Arc Lamp.

An arc lamp which is simple, compact and weighs less than three pounds is shown in the accompanying illustrations, taken from our London namesake. This lamp may be operated by both direct and alternating currents, and is composed of a series and shunt solenoid lying in the same vertical axis, in the center of which works a core. Two levers are mounted in the space between the two coils which gear into each other, and open and close simultaneously by the action of the core which is connected to the lower one. The method of working is as follows: The current enters the upper solenoid by the terminal seen on the right of Fig. 1, attracts the core which is connected to the lower lever, and the arc is struck. As the current in the solenoid diminishes, the arc lengthens and increases the current in the lower solenoid, which lowers the core. The joint action of the two solenoids thus causes the carbons to approach. Thus the lamp is, in fact, an actual balance, which at all times causes the carbons to approach or separate. It is stated that the working of the lamp is constant and not intermittent, as in lamps provided with mechanism for striking and feeding the arc. A suitable resistance must be provided according to the voltage of the circuit on which the lamp is intended to work, and the two terminals connected up to the mains through the resistance by means of flexible wires. Then, the switch being off, the carbons are inserted in the holders, and upon this setting depends the efficiency of the light obtained. In an ordinary arc lamp where both carbons are in the same axis and vertical, the light is radiated in all directions, and it is important in a lantern lamp that all the rays of light should be radiated in one direction, and that through the condenser. To gain these ends the carbons in this lamp can be fixed at any angle, and in any position during the working. Fig. 2 shows the most effective position. The upper carbon is set about one-eighth of an inch behind the lower one and at an angle of 20 degrees. In this position it is found that the crater-like form which the positive carbon assumes reflects all the rays in one direction. The lamp is made for any candle-power from 200 to 2,000, and claims to give double the illuminating power at half the cost of the oxyhydrogen light under ordinary conditions. Mr. F. J. Borland, of 2 Sheepscar Grove, Leeds, England, the manufacturer, also supplies a heavier type specially adapted for limelight effects at from 1,000 to 10,000 candle-power, the lighter lamps being adapted to lanterns, and the system is useful wherever a solid beam of light is required in any particular direction.

Mr. Francis G. Baily, lecturer in electro-technics, University College, Liverpool, has tested this lamp. The lamp was supplied with current from a battery of accumulators at 110 volts, and the current was regulated by the insertion of resistances in the circuit. Mr. Baily reports that the illuminating power of the lamp was maintained with great constancy and entire absence of flickering, and the regulation was most perfect at eight amperes. The instantaneous production of a steady light, when the current is turned on, is a marked feature of this lamp, and renders it specially suited for lantern use. The focusing power is good, and the initial adjustment is simple. We place no value on such a test; any lamp will act well with a steadying resistance in circuit with it, such as that used by Mr. Baily.

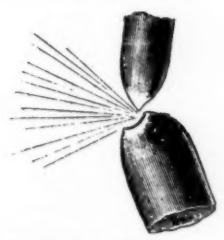


FIG. 2.—POSITION OF CARBONS IN "DOT" ARC LAMP.

ON A PROPOSED MODIFICATION OF THE GENERALLY ACCEPTED TEMPERATURE CO-EFFICIENT OF RESISTANCE FOR COPPER WIRES.

BY A. E. KENNELLY AND REGINALD A. FESSENDEN.

In a paper entitled "Some Measurements of the Temperature Variation in the Electrical Resistance of a Sample of Copper," read at the International Electrical Congress, at Chicago, 1893, and also published in the "Physical Review," Vol. I, No. 4, page 260, the authors showed that the temperature co-efficient of resistance at any temperature ($t°$ centigrade) of a sample of good commercial copper wire, which appeared by chemical analysis to have a high degree of purity, could be very closely represented by the formula,

$$\rho t2\ \rho 0\ (1 + 0.004065t). \qquad (1)$$

Recent determinations by Messrs. Dewar and Fleming and Messrs. Swan and Rhodin concur in giving a linear relation between temperature and resistance.

As the results of measurements made to determine the temperature co-efficient in annealed copper wire, we have, assuming a linear relation for the range from 0° C. to 100° C., as follows:

Benoit	.373
Cailletet and Bouty	.425
Mattheissen	.422
Siemens	.388
Dewar and Fleming	.424
Kennelly and Fessenden	.406
Swan and Rhodin	.415
We obtain as the mean	.4076

We, therefore, suggest that since the exact temperature co-efficient is not yet determined, and since it may possibly vary in different samples of copper in commercial use, that the simple formula,

$$\rho t = \rho 0\ (1 + 0.004t), \qquad (2)$$

may be accepted provisionally for all practical purposes, or, in other words, that the resistivity of copper be considered to increase by 0.4 per cent per degree centigrade of temperature elevation reckoned from the resistivity at zero centigrade.

Should the corrected co-efficient be subsequently determined to be 0.0041, formula (2) would become

$$\rho t = \rho 6\ [1 + 0.004\ (t - 6)], \qquad (3)$$

$\rho 6$ being the resistivity at 6° C.

Similarly, if the co-efficient subsequently accepted should be 0.0042, the corresponding formula would be

$$\rho t = \rho 12\ [1 + 0.004\ (t - 12)], \qquad (4)$$

$\rho 12$ being the resistivity at 12° C., and for an accepted co-efficient of 0.0043,

$$\rho t = \rho 17.5\ [1 + 0.004\ (t - 17.5)]. \qquad (5)$$

Consequently, if we accept equation (2) at the present time, we obtain, pending more exhaustive enquiry, a formula much simpler, more convenient and probably more nearly accurate than that of Matthiessen, while any future correction can only have, it would seem, an influence upon the standard or datum temperature, and a comparatively trivial quantitative effect within ordinary temperature ranges.

ELECTRICAL REVIEW

Published at 13 Park Row,
P. O. Box 2339. NEW YORK.

EDITOR:
CHARLES W. PRICE.
ASSOCIATE EDITOR:
STEPHEN L. COLES.

REGISTERED CABLE ADDRESS:
"ELECTVIEW," NEW YORK.
1546 "CORTLANDT," TELEPHONE CALL.

BOSTON OFFICE:
H. G. TUCKERMAN, Room 29, 620 Atlantic Ave.
WASHINGTON OFFICE:
GEO. C. MAYNARD, 800 H St., N. W.

SUBSCRIPTION TO THE
ELECTRICAL REVIEW.

One Year, United States and Canada, - $3.00
One Year, Foreign Countries, - - 5.00
Single Copy, - - - - - - - .10
Back Copies, each, - - - - - - .25

NEW YORK, FEB. 13, 1895.

CONTENTS.

	PAGE
Views, News and Interviews	73
The Lindner Dynamo	73
Electric Light Convention	73
Obituary	74
Auction Sale of American Bell Stock	74
Electric Light Flashes	74
Electric Railway Notes	75
His First Ride on a Trolley Car	75
The Crypto Hand-Feed Stage Arc Lamp	75
The Gas Motor Street Car in Service	76
Water Power Development and Electric Transmission for Atlanta, Ga	76
Our Bosto Letter	77
The "Dot" Arc Lamp	77
On a Proposed Modification of the Generally Accepted Temperature Coefficient of Resistance for Copper Wires	77
The Bate Case	78
Wall Street and the Electrical Stock Market	78
Hints Upon Daily Work About a Dynamo Plant	79
Dishonorable Journalistic Methods	79
Lightning Doesn't Always Kill	80
An Experience With Electricity	80
A Word of Sympathy From Texas	80
Electricity and Rheumatism	80
Rapid Transit in New York City	80
Where to Hold the Next Electric Light Convention	80
Cotton States and International Exposition	81
Electric Railway Accidents	81
A Worthy Task for Electrical Inventors	81
Efficiency Test of the Stratton Steam Separator	81
General Notes	81
Kindred Interests	84
Telephone News and Comment	82
"The Best Electrical Paper Published."	82
British Journalistic Enterprise	82
Electricity at the Cotton States and International Exposition	83
Additions to a Cable Plant	83
Personal	83
Address Wanted	83
The New Home of the New York Electric Equipment Company	83
Moonlight Schedule for the United States	83
The Telegraphic Historical Society	83
Electrical Patents	ix
Advance Information	x
A Prompt and Safe Shipment	x

INDEX OF ADVERTISERS.

COVER PAGES.

	PAGE
Abendroth & Root Mfg. Co., boilers	xvi
American Electrical Works, insulated wire	i
Ansonia Brass & Copper Co., wire	xvi
Armington & Sims, engines	xvi
Beacon Vacuum Pump and Electrical Co., incandescent lamps	i
Bristol Co., recording voltmeters	i
Bunnell & Co., J. H., dry batteries	i
Campbell Electrical Supply Co., incandescent lamps	i
Day's Kerite, insulated wire	i
Eastern Electric Cable Co., insulated wire	xvi
Fontaine Crossing and Electrical Co., double voltage dynamos	xv
General Electric Co., the monocyclic system	ii
Goubert Manufacturing Co., heaters	xvi
Hampson, E. P. & Co., engines	xvi
Holtzer-Cabot Electric Co., electrical novelties	xvi
Law Battery Co., open circuit batteries	i
McKenney & Waterbury, lamps and fixtures	i
Morris, Tasker & Co., tubes and poles	xv
National India Rubber Co.,	i
New Haven Car Register Co., fare registers	xv
Okonite Co., insulated wire	I, vii, xvi
Partridge Carbon Company, motor and generator brushes	i
Stirling Co., water tube boilers	xvi
Weston Engine Co., engines	i

INSIDE PAGES.

	PAGE
American Bell Telephone Co	xiii
American Carbon Co., carbons	viii
American Electric Telephone Co., long-distant telephones	xi
American Watch Tool Co., bench lathes	xiv
Bain, Forée, electrical engineer	84
Baker & Co., platinum	xiv
Barthel Torch Co	xi
Belden Machine Co., drop forging	xi
Belknap Motor Co., woven wire brushes	84
Benjamin, Geo. H., patents and patent law	84
Bradbury-Stone Electric Storage Co., storage batteries	ix
Brill, J. G., Co., railway cars	viii
Brown & Sharpe Mfg. Co., machinery and tools	xiv
Brush Electric Co., arc lamps	iii
Buffalo Engineering Co	xiv
Central Electric Co., okonite wire, etc	iii
Chapin, Chas. E., R. Thomas & Sons, porcelain	xiv
Clonbrock Steam Boiler Works, steam generators	xii
Colgate Company, Geo. L., lightning arrester	ix
Consolidated Electric Storage Co., batteries	84
Crocker-Wheeler Electric Co	88
Cutter Electrical and Mfg. Co	xiv
Dixon, Jos., Crucible Co., belt dressing	xiii
Dunderdale, C. F., telephone and switchboards	84
Duval, Edward S., Jr., patents	ix
Dynamo-Electric Maintenance Co	xi
Eddy Electric Mfg. Co., Eddy generators	xiii
Edson, Jarvis B., pressure recording gauge	x
Electric Storage Battery Co., chloride accumulators	vi
Electrical and Mechanical Engineering and Trading Co	xiii
Electric Construction and Supply Co., lamps	xi
Empire China Works, porcelain specialties	xiv
Falls Rivet & Machine Co., friction clutches	xii
Faraday Carbon Co., carbons	ix
Faries Manufacturing Co., electric light holder	84
Forest City Electric Works, commutator bars	ix
Fort Wayne Electric Corporation, new "Wood" transformers	v
Garvin Machine Co., machine tools	xi
Harrisburg Foundry & Machine Works, engines	xii
Hart & Hegeman Mfg. Co., snap switches	xiv
Hill, W. S., Electric Co., switches	viii
Interior Conduit and Insulation Co., Lundell dynamos and motors	xiv
International Correspondence Schools	84
Keasbey & Mattison Co., magnesia sectional coverings	viii
Lane & Bodley, street railway engines	xi
Leclanché Battery Co., batteries	xiv
Leffel, Jas., & Co., water wheels	xi
Lehigh Valley Creosoting Co., creosoted lumber	x
Manning, Maxwell & Moore, tools and supplies	xiv
Marshall, Wm., condensers	ix
Mather Electric Co., power generators	ix
Metropolitan Telephone and Telegraph Co	x
Moore, Alfred F., insulated electric wire	xiv
Mutual Life Insurance Co	84
New England Engineering Co	xii
New York Belting and Packing Co., rubber belts	ix
New York Equipment Co	vii
New York Insulated Wire Co	xiv
New York & New England R. R	xi
New York & Ohio Co., Packard lamps	vi
Ostrander & Co., W. R., supplies	84
Oxford Manufacturing Co	x
Palmer Bros., telephones	ix
Partrick & Carter Co., electrical supplies for housework	x
Penberthy Injector Co	xiv
Perkins Electric Switch Mfg. Co., switches and sockets	xiv
Pettingell-Andrews Co., Lundell motors	xiv
Phillips Insulated Wire Co., wire	viii
Phœnix Carbon Mfg. Co., carbon specialties	xiv
Rand, McNally & Co	84
Riker Electric Motor Co	xiv
Royce & Marean, electrical supplies	84
Self-Winding Clock Co., clocks	xiv
Smith, Jas., Woolen Machinery Co	xiv
Solar Carbon and Mfg. Co., carbon specialties	xiv
Splitdorf, C. F., spark coils	84
Stanley Electric Mfg. Co., S. K. C. two-phase system	iv
Stevens, H. L. C., photo-engraving	xiii
Telephone Equipment and Construction Co	ix
Varley Duplex Magnet Co., magnets	84
Washington Carbon Co., Helios cored carbons	iii
Western Electric Co., supplies	xiii
Western Telephone Construction Co., telephones	xiii
Westinghouse Electric & Manufacturing Co., multiphase motors and generators	xii
Weston Electrical Instrument Co., measuring instruments	viii
White-Crosby Co., contracting engineers	ix
Whitney Electrical Instrument Co., voltmeters and meters	ix
Wilkinson, W. H., automatic wiping device	84
Williamsport Wooden Pipe Co., creosoted conduits	xiv
Wyckoff Pipe Co., inc., creosoted tubing	ix

One "G. L.," of Passaic, N. J., writes our *Tea Green* con. that he has read that journal "for nearly a quarter of a century." As the first copy of our dull and unhappy contemporary was issued April 28, 1883, and it is, therefore, not 12 years old, the value of G. L.'s opinion can be easily estimated. Perhaps it seemed that long to him!

THE BATE CASE.

The Bate refrigerator case was not decided by the Supreme Court Monday of last week, as so many in the electrical field had hoped. As the Supreme Court adjourned until March 4 there can be no decision until that time. It is thought at Washington that the decision will be handed down then. The patent situation growing out of this case is an interesting one. Assuming that the present interpretation of the law by the Circuit Court is sustained, there will be no change in vested interests. If, however, the decision of the Circuit Court is reversed, complications will at once arise. The manufacturers doing business in the faith and belief that various patents that would control their industry have expired by reason of a prior granted foreign patent, will find themselves brought under the *prima facie* control of this American patent, which thus suddenly becomes alive, provided the 17 years for which it was first granted have not expired. It is impossible to give any idea of the far-reaching effects of the decision should it thus change the heretofore accepted law. It would cause a lively flurry in patent work, and the persons most benefited by the change would be patent attorneys, and, of course, the few large corporations who have been interested in the suit because of expiring patents of importance to them.

Mr. George H. Daniels, general passenger agent of the New York Central and Hudson River Railroad, has issued some striking pamphlets calling attention to the gradual destruction by quarrymen and others of the beautiful Hudson River Palisades. This vandalism should be stopped at once. The State of New Jersey should see to it that the Palisades are purchased for park purposes, if for no other reason than to prevent their destruction. Every American feels a proper pride in the preservation of this beautiful feature of the historic Hudson, the American Rhine.

The first convention of the National Electric Light Association was held in Chicago, in February, 1885, just ten years ago. For many years the Association met twice a year, but now it meets annually. One by one the pioneer attendants have missed a meeting until now there remains but one member who has the unbroken record of having attended every convention of this Association.

Cleveland will welcome the electric light men most cordially next week. Go!

WALL STREET AND THE ELECTRICAL STOCK MARKET.

The government bond issue was the only feature of any importance and interest which developed in Wall street during the week. It was generally thought that the Administration would sell $100,000,000 of bonds on a 3¼ per cent basis. When the announcement came that it had disposed of a less number on a basis of 3¾ per cent, the financial world was completely astounded. The bonds are 4's, to run 30 years, and on the basis of 3¾ per cent they will cost $104.49. Government 4's of the issue of 1907 are selling at 110, which is on a 3 per cent basis. Were the new issue of 4's to sell on a similar basis they would be worth not 104½ but 120. The sale at the low price will be the cause of either one or two things. Prices of outstanding issues, both of Governments and other securities, must come down, or the syndicate purchaser of new bonds will be able to put up the price. It is probable that there will be an equalization which will result in a depreciation of the old issues and a material appreciation in the new one. There is some 16 per cent to be added to the new bonds before they could be reduced to a three per cent. Even if a quarter of this amount is obtained the profit to the syndicate will be enormous.

In the electrical stock market the only feature was the weakness of General Electric. It was relentlessly hammered, and in such a way as to create the belief that parties were accumulating stock. There are more bears among speculators toward this property since the last decline set in. The lowest price recorded was 28½, which ruled since Thursday. The debenture bonds showed some little strength as compared with last week's quotations, selling at 90.

There was no feature in any of the electrical stocks of lesser activity with the exception, perhaps, of Western Union. This showed pronounced strength, going from the low point of 87½ to the high figure of 89. On Friday and Saturday it reacted and closed the week at 87½. A rumor which accompanied the decline was to the effect that negotiations for a consolidation with Postal Telegraph were being conducted. It was discredited.

The sale of a small block of Milwaukee Street Railway 5's at 64½ had a bearing upon the stock of the North American company. Last year it held $6,447,000 of the 1's and 2's, and $2,861,700 of the stock of the company. The North American stock is quoted at 3¼ to 3½.

The annual report of the Edison Electric Illuminating Company of Boston, for the year ending December 31, 1894, shows gross earnings of $628,406, an increase of $34,318; net income $317,164, an increase of $54,913.

On the Boston Exchange, Bell Telephone sold at 190 to 191. The auction sale of 3,368 shares of its new stock recorded prices of 191, 190, 190⅛ and 189¼. Erie Telephone was sold at 49¾. General Electric

preferred had a sharp drop, establishing a price of 61 as against 67, which ruled the week previous. New England Telephone was steady at 68. Westinghouse securities showed a slight change. The common advanced fractionally, being 32 bid to 32½ asked, and the preferred declined to 49 bid and 49½ asked. BAIN.

New York, February 9, 1894.

HINTS UPON DAILY WORK ABOUT A DYNAMO PLANT.

ABSTRACT OF A PAPER READ BEFORE THE NORTHWESTERN ELECTRICAL ASSOCIATION, MILWAUKEE, JANUARY 16, 1895, BY PLINY NORCROSS.

It is 10 years since I became interested in the business of furnishing electric light to some of my townsmen. Thus far I have used only water power. I know nothing of steam engines or boilers. I am, however, watching with considerable interest the later kinds of gas and gasoline engines.

The creation of the electric current by a dynamo is to me just as much of a mystery now as it was in 1885 when my lamps were first lighted. I have made several desultory efforts to learn something about electricity by reading books, but these books after setting forth the elementary facts, contain so many strange words and hieroglyphics, sines and cosines, that I get tired and sleepy in trying to become acquainted with the wonderful subject, and I have long ago given up any hope of knowing much about it.

Of late, I go to some man who I think knows something about the special matter in hand, and hire him to tell me what I wish to know. I rely considerably upon the men who travel for supply houses and electrical companies for information, and I find that I acquire knowledge in this way quite easily and quite cheaply, provided that I do not buy too much of their goods. In practice, however, my 10 years' experience has not been so pleasant.

We, the pioneers in electrical lighting, suffer some with the inventors. Oftentimes we are persuaded to abandon some article in the hope of getting better and are disappointed, but such experience is valuable in proving that we should not change too often.

I have now in use considerable of the old white underwriters' No. 6 wire, which has been in constant outside service for 10 years and is probably good for 10 more. I am not so sure that it has very much of the insulating property about it now.

At the risk of pounding straw already threshed, I wish to present a few facts which seem quite essential to success. A dry *solid* foundation for dynamos to rest upon is of the utmost importance. We should seek by every possible means to deliver the current to the lamps with the least possible hindrance. A damp floor steals the current, and a trembling or unsteady dynamo tends to an unsteady current and hot boxes and armatures. Heat in and about a generator, however occasioned, lessens its efficiency.

Not long ago I visited a very large and very expensive lighting plant in a western city. The second floor, upon which the dynamos rested, was placed upon heavy iron girders, but the great weight of the dynamos and the great speed at which they were run made such a severe vibration that I could hardly keep my hat on while standing near the dynamos. The waste in coal and burned out parts must have been enormous. Most of the smaller plants, if defective in this regard, can be materially helped by the outlay of a small amount of money. In large plants such defects in the original plan cannot now be eliminated without very serious outlay.

I also call attention to the negligence or carelessness in finishing up generators. If the main shaft is not exactly round, and if it does not rest in boxes or bearings which are perfectly fitted to it and absolutely level; if the babbitting is not of the very best quality and properly put in; if the armature is not accurately balanced, heat is generated, and the efficiency of the generator seriously reduced.

I well remember that one of my tasks when a boy was to turn a grindstone for sharpening scythes. I soon learned to detect the slightest variation in the balancing of the stone. How much more plainly would such a defect be observed in an armature weighing from 1,200 pounds to several tons, and where the speed is from 600 to 1,800 revolutions a minute. So with a shaft not properly turned and fitted, revolving in a poorly fitted box, from 10 to 24 hours a day without cessation, carrying a load from 10 to 150 or more horse-power.

Years ago we thought a dynamo was simply a machine for generating an electrical current, but observation has led me to believe that good workmanship in the parts of a dynamo which are common to all heavy machines built for rapid, severe, constant use, is fully as essential as the electrical features.

Give me a slow speed dynamo, which has a heavy, substantial broad base; large accurately turned shafts; long heavy boxes, babbitted with the very best material; let the pulley be a little too wide, instead of a little too narrow; then put in a wider belt than you really think you need; have the boxes beautifully fitted and self-oiling; then furnish the finest lubricant which money can buy, and you have in such a machine, so equipped, laid the sure foundation for good work with the least possible outlay of power, so far as the dynamo is concerned, and just think of the peace of mind and serene comfort you will have. In this way you have eliminated a large per cent of the trouble which seems incident to the business.

As regards dynamo oil, we have the same difficulty as with cigars. A good brand is put on the market; the goods are kept up to the high grade for a while, then the consumer finds fault because the price is so high, and then the maker, anxious to hold his trade, cuts the price, but also cuts the quality of the leaf or the price of making, or he becomes careless in assorting the material. So with oil. Any oil maker can make good oil for a dynamo. Quite often it is the fault of the consumer that he will not buy a good lubricant. He thinks the cheap grades will do well enough. Nothing is too good or too nice to be used in the generation of electrical current. Poor oil is dear at any price, and good oil is cheap at any price. Anything and everything to keep a dynamo cool. You all know how hard it is to keep a dynamo cool on a hot Summer's night. When an armature burns out, it means delay, trouble and expense. Good oil is an important factor in the problem. A blower is a great help and costs but very little. A current of cool air directed upon the heated parts may prevent disaster. The later style of generators are made with reference to their being taken apart and cleaned.

Another source of constant trouble and waste of energy is the slipping of belts. Apply a speed indicator to the driving shaft, and then to the dynamo shaft, and you will find in all high speed machines a loss, especially if the driver pulley is a small iron pulley. A slip is a sudden stop and start. It would not be noticed in a saw mill or turning lathe, but is bad anywhere, and especially on a dynamo. It directly affects the light and tends to heat a machine.

There are several causes; oftentimes the belt is too short; oftentimes it is too narrow; sometimes the belt is overloaded; again, the pulley on the dynamos is so small that the belt cannot get sufficient contact with its surface. Again, excessive speed will alone induce it. Also greasy belts are bad.

One means of relief is the use of a wider belt. In this way we can have a looser belt and more sag, and thus more contact on the smaller pulley and less tension. Again and again I have noticed belts strained to their utmost capacity. A few dollars expended in changing the small pulley belts for a wider one would eliminate the trouble.

Keep the belt pliable by the sparing use of some good belt dressing made by any good belt-maker. As to pulleys, I prefer iron for the heavy large drivers, but I like wood or fiber for the small driven pulley. If you have iron, they can be improved by putting leather or canvas or, perhaps, paper on the outside, but it must be carefully done by an expert, or it will come off and make serious trouble.

The day of the high-speed dynamo is past. If you ever buy another, get a slower speed machine. Of course, a direct connected is better, but to many of us that means a great outlay. We can't change our whole outfit every year or two, but when we do make changes, let it be on the line of improvement.

Another thing which I think helps producer and consumer is a uniformity of dynamos and lamps in a plant. I call to mind several large plants in which there were hardly two dynamos of the same make, and there were several kinds of lamps in use. I doubt the wisdom of such an equipment. One hundred dollars spent in looking at different plants and ascertaining by actual observation the kind of machine which is best adapted to your use is a good investment.

Get all the information you can from the secretary and superintendent, but be sure to call on the man who cares for the engine and dynamo. Don't rely wholly upon the men who make and sell the machines, although I think they can be relied upon to hint at the defects of other kinds than their own. The test of long actual use is, after all, the best thing. Having secured a good dynamo, see that it is properly put up as before suggested, and when you add to your plant get the same kind, unless you are very sure that you made a mistake in your first purchase. In this way your customers all get the same service. If there is trouble in lamp or dynamos, you look to one company. The seller cannot evade the responsibility by putting it upon the other machine or lamp. He must be your friend and silent partner, and he must help you.

(To be concluded.)

Dishonorable Journalistic Methods.

An official of the Brush Electric Company writes us the letter published below. It expresses the outraged feelings of one who has been tricked through placing confidence where, we say it regretfully, as we respect journalism, we are convinced, no confidence is deserved:

THE BRUSH ELECTRIC COMPANY,
CLEVELAND, OHIO, February 7, 1895.

TO THE EDITOR OF ELECTRICAL REVIEW:

Your telegram received yesterday noon contained matter which threw the entire office into a fighting attitude. I sent telegrams to all the papers, exactly as the one sent you Monday morning. Your telegram stating that you would like very much to publish this week was received, and I thank you sincerely for having sufficient courtesy to send this telegram. This courtesy was entirely lacking in the case of the *Electrical World*, as it appears they proceeded to publish the article and trust to explanations afterwards.

I have received the article in question this morning, with a written explanation of the fact that my telegram, absolutely requesting delay until next week, was received too late, etc.

We live a considerable ways from Broadway, New York, where smart men are produced, but think we are just smart enough to see through this transparent excuse. This is a matter of deep regret to the writer, as well as to the Brush Electric Company. This article was prepared by the writer, and photographs supplied, and it does seem as though an editor of a paper would have the courtesy to respect my request for the date of publishing. In fact, *I have their letter stating that they would publish whenever designated.* I sent the following telegram to Johnston yesterday:

"We wired you Monday* morning, February 4, requesting you to publish arc light article in your issue 16th. You utterly ignored this request. This may be quite a joke on your part, but we look on it as the meanest journalistic trick ever played on us."

I trust you will find it in your heart to publish the article with a number of the photographs, although, as it has appeared, I cannot expect you to do so. Johnston's article certainly gave a very meagre description of such an important plant.

Yours very truly,
L. H. ROGERS,
Assistant General Manager.

It is scarcely necessary to add a single line to the above indignant words of Mr. Rogers. There is no enterprise in taking that which no labor of your own provided and which does not belong to you—such acts are known by another name. Four other electrical journals could easily have displayed the same Faginish "enterprise," but they preferred to retain their self-respect. The article and photographs mentioned by Mr. Rogers were in their possession, having been sent to all alike.

There are two courses for honorable editors when copy is advanced:

No. 1—Publish only on the date designated.

No. 2—If instructions come too late, instantly notify the author—the one who trusted to your honor—and he can then release others, or take such action as he may deem best to keep faith with those who kept faith with him.

In conclusion, to show the natural belief of Mr. Rogers that he was dealing with editors worthy of trust, and not with tricksters, we append his second telegram sent in reply to one from the ELECTRICAL REVIEW stating that we were ready to publish at once:

Cleveland, O., February 4.—Please do not publish this week. *No other paper will publish until next week.* L. H. ROGERS.

We are glad, as indicating the reputation of editors of electrical journals, that the words we italicise appear. We regret the sender's confidence was betrayed by a member of this profession. The ELECTRICAL REVIEW has no hesitation in pointing with finger of contempt to the guilty one—and this is not the first instance of a similar nature from the same source—and to express the belief that in no other publication office of our acquaintance would such dishonorable practices be permitted.

* A similar telegram was received by the ELECTRICAL REVIEW over the Postal wires, at 10.40 A. M. Monday, February 4, and no doubt received by the other journals at the same hour, and probably earlier by the one with office in the Postal building.

LIGHTNING DOESN'T ALWAYS KILL.

THEODORE CLOTHIER, OF STANWOOD, IA., SURVIVES A TERRIFIC SHOCK AND TELLS ABOUT IT—HE HAS BEEN "KILLED FOUR TIMES" BUT STILL DEFIES GRIM DEATH—OTHER INTERESTING COMMUNICATIONS.

Dr. D'Arsonval, of Paris, Mr. Cutler, who took 4,600 volts at the Stanley Electric Manufacturing Company's factory in Pittsfield, Mass., and was revived, as well as many other readers of the ELECTRICAL REVIEW, will be interested in the case of Theodore Clothier, of Stanwood, Ia., who survived a heavy lightning shock and several other forms of death and who appears to be a pretty hard man to kill. His case was brought to the attention of the ELECTRICAL REVIEW and we set about to verify Mr. Clothier's experience. The interesting story has developed as follows:

Mr. M. E. Shipley, the editor and publisher of *The Herald*, of Stanwood, Ia, where Mr. Clothier at present resides, says:

The editor of this paper has interviewed Mr. Clothier, who is at present living in Stanwood, he and his son having the contract to erect the Wilkins block, and he verifies all statements in the following article concerning his being struck by lightning at this place some 25 years ago. It was written by our fellowtownsman, Frank H. Miller, for his uncle's paper, the Quincy, Ill., *Herald*, and was published in that paper as follows, except for a few corrections we have made as suggested by Mr. Clothier.

Here follows an abstract of the article mentioned:

This case came under the writer's observations on the 11th of June, 1870. It was near Stanwood, Cedar County, Iowa, on a clear and extremely warm day. Theodore Clothier, a carpenter, 29 years of age, was riding along the road bestriding a saddleless horse. In all the sky there was only one cloud visible, and it a comparatively small one. Two men in a light wagon had just passed Clothier when a tremendous thunderclap was heard. Looking back they saw horse and rider prone on the ground. The lightning struck Clothier in the right breast, passed down his body, through the horse and into the ground. The horse and rider were instantly "killed." The rider tumbled over backward and was apparently as thoroughly killed as ever a lightning-killed man was when the two men reached him. They found his clothing on fire and extinguished it. The vest was found to have been charred from the armhole to the lapel on the right side. The hair was burned from his forehead and his eyebrows and eyelashes were burned off. From near the shoulder to below the ribs was black charred flesh that rubbed off on being touched; below was a wound as large in dimensions as a man's hand, and so deep that when the incinerated cuticle was removed the internal organs were nearly exposed. From this point the lightning shot to a rule carried in a pocket made in the trousers' hip. The rule had brass tips that were melted by the heat. His keys and the ring to which they were attached and the nail set he carried in the pocket were likewise melted, as were the blades of his knife.

While the group who had gathered were discussing what was best to be done, one of the men of the wagon, who was a veteran of the war, and who had seen five men killed by lightning and three of them restored to life again, declared his intentions to restore animation to the body of Mr. Clothier, and proceeded to carry out his intention, much to the surprise of bystanders, who objected. But the veteran was of a determined character and was allowed to have his own way. He rolled the body over to its left side; as he did so the charred flesh rubbed off. Here the gathering remonstrated with him again to desist, but would not.

"If he's dead I guess it won't hurt him," was his reply, and he continued to rub the body vigorously where it had not been burned. He never let up, and in about 30 minutes the dead man showed signs of life. Water was sent for and his face was bathed. He was removed to a house near by and turned over to three doctors who had been summoned.

When restored to full consciousness he was in such excruciating pain that he had to be placed under the influence of opiates. This course was continued for nearly four days. He suffered greatly even after that, but his burns healed and he recovered his health.

The flash that struck him killed

THEODORE CLOTHIER, OF STANWOOD, IA., WHO SURVIVED A LIGHTNING SHOCK AND OTHER FORMS OF DEATH.

the horse after it had passed down his body, leaving scars—dark, red, angry scars—as plain to-day as they were 25 years ago.

The course pursued in restoring him to life was very similar to that pursued with artificial respiration as a basis.

Now, here is what Mr. Clothier himself has to say about this and other interesting episodes in his life:

TO THE EDITOR OF ELECTRICAL REVIEW:

In answer to your letter, which came to hand a few days ago, I will say I am the man. I sent you a Stanwood paper last night. Now, that hasn't it all. Now, I came to in about 30 minutes, but did not know anything for two hours or more.

I can't see the lines on paper, can't read, can't get any glasses that will do me any good, but think as age creeps on my sight fails faster; can't tell my wife when she passes me on the street if the sun is shining.

Now, I can furnish 100 or more witnesses. My nervous system is destroyed. I can't stand any excitement.

I have been blowed up with powder, drowned, was one out of nine that were poisoned in Benton Barex and I was the only one that lived, but lightning left its mark. I have been killed four times, but am alive and quite well.

I get letters from all over asking if I am alive and did such a thing happen, and I will say it did, and I can give the banker and merchants of Stanwood for witnesses. The most of them were on the ground before I was taken to the house. There is much more to this that has not been in print. Now, if there is anything more that you want to know I will only be too glad to answer. If you should put any of it in print please send me a copy and oblige

THEO. CLOTHIER.

Stanwood, Ia., January 17, 1895.

AN EXPERIENCE WITH ELECTRICITY.

A CORRESPONDENT SEES ELECTRIC LIGHTS WITHOUT WIRES AND FEELS THE CURRENT.

The following communication appeared in a recent issue of the Massillon, O., *Evening Independent:*

MR. EDITOR: I have read a great deal about electricity in my life, but I never heard of anything like what I experienced myself. Perhaps my adventures will be of benefit to some of my fellow engineers. On January 26, you will remember, it was a cold and blustery morning. The wind was blowing at a high rate and the snow flew thick and fast. I went to work as usual at 6 o'clock in the morning, and after I had been in the engine room probably half an hour or so I noticed a bright electric light appear from under a piece of sheet-iron on the floor, about 18 inches from a red-hot stove, and probably six feet away from my engine. Now that light appeared there off and on until about 10 o'clock, and nothing has been seen of it since, and I will not be sorry if it never returns, for while that light was there I experienced several slight shocks in the handling of different tools in the engine house.

This did not arouse my curiosity until the fireman came in with the oil can, and I reached for it, and immediately we were both shocked until we yelled; at the same time I was satisfied that the engine or engine room was loaded with electricity.

In a few seconds it became necessary for me to start the engine, and while doing so I picked up a poker to open the stove door, and I was about to touch the stove when off she went. Now, I can't say that I was shot for I had not time to think then, for it jerked me out of the chair. The fireman stood there laughing and asked what was the matter. I told him to sit in that chair and take hold of the throttle and open the stove door. He got the same dose and I could not hire him to do it again. One of the shop hands tried his luck also, and got his money back in the same way as we did. Now, I believe I have given the particulars in this case, and if this should come before the eyes of anyone who is able to explain this puzzle through the columns of this paper they will confer a great favor on me. Now, friends, some of you who know me and know of this incident may laugh about it, but I tell you it did not seem a laughing matter to me at that time. I believe there are men within the circulation of this paper who can explain this.

DEXTER.

East Greenville, February 2, 1895.

A Word of Sympathy from Texas.

TO THE EDITOR OF ELECTRICAL REVIEW:

Say, can't you let poor —— alone? I can't see that he has hurt you any, as you always have been away in the lead. I think I secured your first issue and subscribed for several years, and am taking it again now. The REVIEW was a good paper then—it is better now—but I am and always was sorry for ——. C. H. E.

Brenham, Texas, February 1, 1895.

ELECTRICITY AND RHEUMATISM.

EXPERIENCE OF AN ELECTRIC LIGHT SUPERINTENDENT.

TO THE EDITOR OF ELECTRICAL REVIEW:

I saw in your paper an article asking for information in regard to what effect dynamos have on persons who have rheumatism. I will give you my own experience and if it will be of any use to your correspondent I shall be glad.

I was born and raised in Massachusetts and can hardly remember the time when I did not have rheumatism. From the age of 10 to 19 years I suffered intensely with it. Then I came to San Antonio, Texas. For two years I was free of it, although out of doors in all kinds of weather. Then it returned again. About this time I obtained work in an electric light station at Galveston, Texas, which was the first one in this State, I believe. For four years I was constantly at work in this line, two in Texas and two in Detroit, Mich. During all this time I was not troubled with rheumatism. After this I was for four years on a ranch in Western Texas in the most healthful part of the State. Here the rheumatism returned again, but not as bad as when I was a boy in Massachusetts.

For the past six years I have been employed around dynamos when running, and do not have rheumatism, although it is a very common complaint here and I am exposed to all kinds of weather. I am not around the dynamos to exceed two hours out of the 24. I shall be glad to answer any questions your correspondent may wish to ask.

Yours respectfully,

CHAS. H. EDDY,

Superintendent Electrical Department Brenham Compress, Oil and Manufacturing Company.

Brenham Texas, February 1, 1895.

Rapid Transit In New York City.

The Rapid Transit Commission has practically adopted the route provisionally adopted by the old board and has declared that the extension of the elevated system should not be regarded as rapid transit, under the provisions of the act defining the duties of the commission. The board received assurances from the Ryan & McDonald Construction Company and the Drake & Stratton company that they were prepared to begin within 30 days the construction of an underground road along the routes laid out, the cost to be within the limits of the $50,000,000 authorized by law. The question will be formally voted upon this week.

Where to Hold the Next Electric Light Convention.

New York city is getting to be the favorite place of meeting for national and State associations of all kinds. All railroads focus here; this city offers the best hotels and the finest attractions, and as a result it is favored beyond smaller cities which have heretofore been the meeting places of many social and mercantile organizations.—*Mail and Express.*

Cotton States and International Exposition.

Mr. H. M. Atkinson, chairman of the Committee on Electricity of the Cotton States and International Exposition, has issued the following:

DEAR SIR: We inclose herewith detailed information about the Cotton States and International Exposition to be held in Atlanta, Georgia, September 18 to December 31, inclusive; also a plan of the grounds.

It is the desire of the management to make the department of electricity one of the main features of the exposition, and an ample building is provided for exhibits in the electrical line. The aim of the exposition will be to cover the field of electrical progress as fully as possible and to exhibit all kinds of apparatus, supplies and devices without fear or favor.

It may be pertinent in this connection to call your attention to the widespread development in the South in an industrial line. There are indications that the most important development of the country will be in this section during the coming years. Cotton manufacturers and other investors are turning their faces this way in numbers. In short, it is manifest that the South's good time is at last coming, and that an era of growth is at hand.

In view of these important facts, it would seem necessary that you fall in line with this movement. What could be more opportune than the chance provided by the exposition? The transmission of power by electricity is destined to play an important part in the aforesaid development, and an exhibit in your line will be an object lesson far-reaching in its effects. You cannot afford to be absent.

An estimate has been made that 454 arc lamps will be required for outside lighting of the grounds, 236 arc lamps for inside lighting of the building, 10,000 incandescent lamps, mainly for illumination of buildings outside. In addition a large number of lights and considerable power will be required for concessions and exhibits.

One plan in contemplation by the management is the division of the grounds into a number of sections, each section to be lighted and provided with power by a different manufacturer of electrical apparatus; steam power for the operation of dynamos and generators to be furnished by the exposition company. The division of the grounds into said sections would depend largely upon how many and what propositions for lighting or furnishing power are made.

To come to the point, will you undertake the lighting or furnishing power of any portion of the grounds and buildings complete, starting with the dynamos or generators, all of said installation to be put in and operated as an exhibit? In case you cannot provide a complete light or power installation for a section of the grounds, you might do so in connection with other manufacturers.

In any event let us know what you will furnish to be put in operation as your exhibit; also, what space in the Electrical Building you will want. Of course, all lighting of the grounds and buildings will have to be done under contract with the exposition company, under the direction and supervision of the exposition management, the whole department working from one common and supreme head.

As time is short an immediate answer is requested.

H. M. ATKINSON,
Atlanta, Ga., January 28, 1895.

Electric Railway Accidents.

Mr. George H. Benjamin, the well-known patent attorney, recently sent to the New York *Evening Post* the following communication:

An analysis of 3,417 accidents, chargeable to street railways operated by what is known as the "trolley system," shows that these accidents were due to two causes—*i. e.*, 2,864 to the high speed at which the railways were operated; 553 to the imperfect engineering construction common to the overhead portion of all electric street railways in this country.

Regarding the first-mentioned cause (high speed of operation), it is undoubtedly a fact that the cars are driven at too high a speed for safety within the crowded streets of a city. The average and practically maximum speeds at which cars are operated by horse and cable-power are, respectively, six and eight miles an hour, whereas, with electric power the average is 12 and the maximum about 25 miles an hour.

From such statistics as I have been able to obtain, I reach the conclusion that the number of accidents is approximately as the square of the speed at which the cars are operated. In view of the fact, therefore, that no efficient life-saving device can be attached to a car and used in a crowded city, it is necessary to lessen the number of accidents attributable to the first cause, to reduce the speed to a safe limit, which in any event should not exceed eight miles an hour within the corporate limits of a city. On country roads a greater speed may be permitted without any very great risk.

As to the second cause, it is evident that the overhead construction, where formed of stretched wires, lacks every element of stability, is essentially dangerous and a constant menace to life and property. Public safety demands that the present construction of stretched wires be entirely done away with. Aside from æsthetic considerations, there is no controlling reason, electrically or otherwise, why the overhead construction should not consist of a very light steel structure, provided with suitable means for carrying and protecting the conductors which convey the currents.

There is nothing new in this suggestion, and where adopted, as it has been in various parts of Europe, such a thing as a broken wire is quite unknown. Further, the danger of diversion of the current into buildings, with the consequent fire risks, is out of the question. From a careful examination of the subject I am quite convinced that the numerous accidents, involving loss of life or limb and fire, can easily be prevented by attention to the requirements for safety above outlined.

A Worthy Task for Electrical Inventors.

[*From the New York Sun.*]

Building water-tight compartment ships like the "Elbe," or much better than the "Elbe," won't prevent some of them from being sunk by collisions. If the "Lucania," for example, the last and finest from the shipbuilder's hands, should hit her sister, the "Campania," square amidships, the latter would be lost as surely as she would be hurt. The only safeguard for ships at sea is in the faithful use of some more penetrating sound than that of the fog horn, or the invention of some delicate electrical contrivance which shall always tell of another ship's presence in the neighborhood.

Where are the wits of our ingenious brothers, the electricians?

Efficiency Test of the Stratton Steam Separator.

The Stratton steam separator, made by the Goubert Manufacturing Company, 14 and 16 Church street, New York city, was recently subjected to an efficiency test by Professor R. C. Carpenter, of Sibley College, Cornell University, Ithaca, N. Y. The full report of the test follows:

ITHACA, N.Y., January 5, 1895.
GOUBERT MFG. CO.,
Nos. 14 and 16 Church street,
New York city.

GENTLEMEN—I send you with this letter a short summary of the test which we have made on the Stratton separator. The results show that the separator is practically perfect, and removes all the moisture which can possibly be taken out by mechanical means. I think we will

SECTIONAL VIEW OF THE STRATTON STEAM SEPARATOR.

make another test in which we inject water into the steam pipe, thus increasing the percentage considerably of water in the steam supplied. This latter will not be of any great practical interest, but will bring out, of course, the capacity of the separator for extraordinary conditions. If you have no objections I will publish a copy of this report in the next number of the Sibley *Journal*, and for that purpose would be pleased to have you loan us an electrotype showing vertical section.

TEST OF STRATTON IMPROVED SEPARATOR.

For this test the steam pipe leading to the separator was surrounded for a portion of its length with a jacket which could be filled with water to any desired height; the purpose of the water jacket being to condense as great a per cent of the steam as possible. The discharge of steam from the separator was led to a surface condenser, where it was condensed and the amount carefully weighed. The drip or water discharged from the separator was led to a barrel standing on a pair of scales, and accurate weighings were made of the water taken out from the steam by the separator. A throttling calorimeter was placed in the steam pipe directly after the steam left the separator. Pressure gauges were placed either side of the separator. Observations were taken and the results reduced by Messrs. Collins, Hubbard and Thomas, of the Class of '94. The following is the general summary of the results: The steam supplied to the separator contained moisture, the percentage of which varied from a little over five to nearly 21. That discharged from the separator was in every case nearly dry, it containing in every instance less than one per cent of moisture. The separator was worked up to its full capacity, and there was no appreciable reduction of pressure. The summary of the results of different runs is given in the appended table. During these runs the water was kept at a constant height in the separator.

No. of Run.	Pressure of Steam.	Moisture in Steam Supplied Separator. Per Cent.	Moisture in Steam Leaving Separator. Per Cent	Quality of Steam Leaving Separator. Per Cent of Dry Steam.
1	60	6.55	0.95	99.05
2	61	17.2	0.94	99.06
3	62	15.31	0.9	99.1
4	76	15.6	0.6	99.4
5	61	20.8	0.8	99.2

Respectfully submitted,
(Signed) R. C. CARPENTER.

GENERAL NOTES.

William Meter has asked the Common Council at Sheboygan, Wis., for a franchise for the operation and maintenance of a telephone system in that city.

The Shelbyville, Ind., Mutual Telephone Company has contracted to put in 175 telephones in that city, at $1 a month for private residences, and $2 for business houses.

The only copper mine in Colorado is located near Salida, Chaffee County, and from the date of its discovery up to the first of the year it has produced 23,630 tons of ore, or about 5,474,000 pounds of copper. The property is still being worked.

The large Berlin Horse Tramcar Company has just put three accumulator cars in service between Lichterfeld and Moabit. Every car has accommodation for 20 sitting and 11 standing passengers, and the weight of the car, without passengers, is close upon eight tons.

According to the *Elektrotechnische Zeitschrift*, Herr Hefner von Alteneck's opinion is that the wearing away of trolley wires is not due to electrolytical action caused by damp weather, as has been suggested, but is due to the formation of sparks caused by the imperfect contact of the conducting wire and trolley wheel.

At a meeting of the stockholders of the Chicago and Northwestern Telegraph Company held last week the following gentlemen were elected directors for the ensuing year: Thomas P. Scully, John B. Manning, A. R. Brewer, I. McMichael and James T. McClelland. The directors subsequently met and unanimously elected Thomas P. Scully, president, and A. R. Brewer, secretary.

TELEPHONE NEWS AND COMMENT.

Camden, S. C., may have a Bell exchange.

Jackson, Mich., is to have a new telephone company.

The new exchange at Thomasville, Ga., has opened with 45 subscribers.

A bill asking for reduced telephone rates will be introduced in the Connecticut Legislature.

Petersburg, Va., has appointed a committee to try and secure cheaper telephone service for the city.

The Bell people have reduced rates at Norwalk, O., to meet the competition of the new Harrison exchange.

The Missouri and Kansas Telephone Company is rapidly extending and improving its service in towns near St. Joseph, Mo.

The question of building a telephone line from Galesville to North Bend, Wis., a distance of 15 miles, is being strongly agitated.

Contracts have been signed and work commenced for a new telephone line between Gillette, Cripple Creek and other points in that district of Colorado.

The Johnstown Telephone Company has applied for a charter at Johnstown, Pa. Rates, $1 a month for residence and $2 a month for business houses.

The Harrison company will put in a new exchange at Painesville, O., if a franchise can be obtained. Citizens are clamoring for lower rates than the Central Union people are giving.

A new company is about ready to give Somerset, Ky., a chance at cheap telephone service. Other towns in that State are inviting the attention of new companies to their wants.

A telephone line is wanted between Kilbourn and Friendship, Adams county, Wis. There is not a mile of railroad, telegraph or telephone in the county seat, Friendship being isolated except for a stage mail.

The Martinsville Telephone Exchange Company has been granted a franchise by the City Council of Martinsville, Ind. The system, it is said, will be in operation within six months. H. R. Winn and J. T. Foley are the projectors.

The Indiana Telephone and Construction Company has closed a contract with the Merchants' Mutual Telephone Company, of Michigan City, Ind. The Strowger automatic exchange is to be installed. The new company has 125 subscribers.

Argument on the application of Simon Sterne to permanently enjoin the Metropolitan Telephone and Telegraph Company from removing the telephone in his office in New York city, which was to have come up in the Supreme Court on February 6, has been adjourned to February 18.

A new telephone company will start an exchange in Salem upon two conditions. The first of these is that a sufficient number of subscribers can be secured, and the second is that the Board of Aldermen will give permission to have the poles and wires in the streets.—*Salem, Mass., Observer.* Too bad about those conditions!

Suits have been instituted by the Western Electric Company at Hartford, Conn., against Gen. E. S. Greeley and the E. S. Greeley & Company, of New York, for alleged infringements on certain magneto and other detail telephone patents. The Greeley company is a Connecticut corporation, hence the bringing of the suits in that State.

The Missouri & Kansas Telephone Company has elected these directors: John E. Hudson, Boston; A. G. Fuller, Omaha; J. R. Mulvane, E. R. Wilder, Topeka; S. A. Walker, St. Joseph; N. R. Ferguson, J. S. Chick and A. Burt. Mr. N. R. Ferguson, treasurer of the company, has been made secretary and superintendent vice the late Wiley W. Smith.

The Drawbaugh Telephone and Telegraph Company has established its principal offices at 256 and 257 Broadway, New York city. The officers and directors of the company are: John R. Bartlett, president; Marcus Marx, vice-president; Henry C. Andrews, treasurer; Albert P. Fisher, secretary; Frank Jones, Parker C. Chandler, James Jourdan and Joseph F. Stokes. Messrs. U. T. Fackenthall and L. M. Simpson are the general managers.

At the annual meeting of the Saco River, Me., Telephone and Telegraph Company the following board of directors were elected: Mark P. Emery, F. H. Hargraves, S. B. Shepard, C. F. Clark and John Berryman. At the directors' meeting Mark P. Emery was chosen president; F. H. Hargraves, vice-president; S. B. Shepard, superintendent; John Berryman, secretary and treasurer. A dividend of five per cent was declared payable in April.

At a banquet given to United States Senator-elect Lucien Baker at Leavenworth, Kas., a telephone serenade was enjoyed between courses. The *Times* said: "An instrument was placed in the gallery of the hall and by the use of a long-distance transmitter music was brought all the way from Kansas City. The voices of singers in Kansas City were distinctly heard in all parts of the hall. The singing sounded a little strange, but it was brought over very clear and with all its sweetness. Later on in the evening the audience was entertained with a cornet solo, every note of which was plainly heard. The serenade was kindly furnished by the Missouri and Kansas Telephone Company, and the success of the same was due to the efforts of Charles W. McDaniel, superintendent at Kansas City, and Local Manager O'Brien."

It may be of interest to some of the "outside" telephone companies to know that the American Bell Telephone Company owns all the patents on instruments bearing its name and used by its licensees, while the Western Electric Company owns all the switchboard and detail patents on apparatus used in Bell exchanges. The American Bell Telephone Company owns 60 per cent of the Western Electric Company's capital stock and is naturally its controlling influence in telephone matters, at least. It is not believed, however, that the American Bell instigated the suits recently brought and to be brought by the Western Electric against alleged infringers of its magneto, hook and switchboard patents, although the former was doubtless cognizant that the step would be taken. The Western Electric Company manufactures nearly all the apparatus used in Bell exchanges and is said to own about 1,500 patents on switchboards and other detail apparatus.

By the use of a long-distance telephone and a private system of modern exchange telephones Mr. Edwin Gould recently held a corporation meeting of the Continental Match Company, with 38 miles of wire separating him as president from the other officers and directors of the company. The Continental Match Company's factory is situated at Passaic, N. J. It is incorporated under the laws of that State. The capital stock of the company was lately increased, and it was found necessary to hold a meeting to settle some formalities according to the charter and rules of the company, which provide that the meetings must take place in the offices of the company. The directors assembled at Passaic while Mr. Gould was at his home in Dobbs Ferry, N. Y. Connected with the long-distance telephone is a factory telephone system with a central station and a dozen receivers and transmitters so arranged that a call can be switched to a private desk, or, by moving another switch, so that one call can be heard by everybody who has a receiver. Each director attached himself to a 'phone and the meeting began. The secretary read the minutes to Mr. Gould, who asked over the wire: "What is your pleasure, gentlemen?" and each in turn replied into his transmitter, "Move it be accepted." "The secretary's report is adopted," came back. Then other business was taken up and disposed of in the same fashion, and even the purchase of an additional plot of land and the erection of an additional building was discussed and decided upon over the 'phone. The telephonic meeting lasted a full hour and the tolls were pretty heavy. The question of the legality of the meeting has been raised, as the company transacted corporation business in two States. A lawyer says the meeting was legal.

An investigating committee on February 5 began probing the charge that $350,000 of the Mutual Automatic Telephone Company's stock had been paid to secure the passage of the company's bill through the Philadelphia City Councils. John P. Persch, the chief promoter of the scheme, is said to have run away, but the committee secured the transfer books of the company and produced some startling revelations. It was shown that Charles A. Porter and David Martin, two well-known Philadelphia politicians, had received 1,525 shares each of the stock of the concern, the value of the 3,050 shares being $150,000. Among the effects of the late Hugh T. Piggott, a Common Councilman, were found six shares of stock of the company. The books showed that J. C. Gale, a clerk of the telephone company, held in trust blocks of stock in six and 20 shares. The latter blocks were for Select and the six share lots for Common Councilmen, it is believed. Finding the Piggott shares revealed the plan. The Councilmen were badly scared. Each will be called to swear whether he received any of the stock. The penalty for bribery is $10,000 and five years' imprisonment. Colonel W. H. Eckert, of New York, President of the Mutual Automatic Telephone Company, testified that he knew nothing about the manner in which the company's franchises were secured. Colonel Eckert told of "an irregularity" in increasing the stock of the concern from $300,000 to $1,000,000, a record of such increase not being made. The witness detailed his futile endeavors to learn why this was done, and finally "called in" all of the stock for the purpose of making it regular. "All the issue is now in," said the witness, "with the exception of 20 shares." Colonel Eckert was not aware that any money had been paid for any of the stock. The final and most unwilling witness of the day was Thomas H. Stackhouse, the secretary of the company. Mr. Stackhouse said he presented his resignation to President Eckert and other officials on January 18 last, but that it had not been accepted.

"The Best Electrical Paper Published."

To the Editor of Electrical Review:

Inclosed you will find a draft on the Fourth National Bank of New York for three dollars ($3.00), in payment of subscription for the Electrical Review for the year 1895. Please acknowledge receipt and oblige.

I could not get along without the Review. I think it is the best electrical paper published.

A. Hoopes.

Dubuque, Ia., February 5, 1895.

British Journalistic Enterprise.

The London *Electrical Engineer* gives its readers the following frank advice as to where to look for news:

Strike.—A strike of electric tramway employés is taking place at Brooklyn, New York. A full report of the proceedings will doubtless be found in *our contemporaries.*

Electricity at the Cotton States and International Exposition.

The Electrical Committee of the Cotton States and International Exposition, which will be held at Atlanta, Ga., from September 18 to December 31, 1895, has begun work in earnest. The plan for lighting the grounds reported by Chief of Construction Wilkins included 829 arc lights of 2,000 candle-power each, and 10,700 incandescent lights of 16 candle-power each. This requires a steam plant of about 3,000 horse-power to give a good margin. Mr. J. H. Allen has arranged for the steam plant, and the Electrical Committee is now undertaking to secure the necessary equipment for lighting. They have sent out circular letters inviting proposals for lighting the grounds by sections, the idea being to interest a number of strong companies and introduce an element of rivalry, which will result in brilliant electrical effects, and also secure competition and good exhibits in the Electricity building.

One of the most attractive features of the Cotton States and International Exposition will be the reproduction of the World's Columbian Exposition in miniature by Mr. G. W. Ferris, the builder of the Ferris Wheel. The great World's Fair will be reproduced in its entirety, complete in every detail, on a scale of $\frac{1}{140}$th. This makes the Manufactures and Liberal Arts building about 10 feet long, and the whole Exposition 75 feet long. The material is white holly and the workmanship exquisite. The electrical effects will be perfectly reproduced and the smallest lights ever seen will be used in decorating the various buildings. Search-lights will be shown on the battle ship and the various buildings, the intramural railway will be seen with cars in motion, the whale-back steamer will be seen arriving and departing and Lake Michigan will appear in the distance. By electrical and mechanical effects, sunrise, daylight, moonrise, and the White City by moonlight will appear in succession. The miniature city is decorated with all the statuary and ornaments that appeared in the original.

Additions to a Cable Plant.

The Standard Underground Cable Company, of Pittsburgh, during the past year has furnished many underground feeders for street railways, and had at one time four separate large contracts under construction simultaneously, two in Philadelphia, one in Boston and one in Rochester, N. Y. The company has in its employ a large force of experts and well organized gangs of trained men, experienced in and familiar with all classes of underground and overhead cable work, whether for telephone, telegraph, electric light or street railway service. In order to relieve the crowded condition of the factories, the company erected during the past year a two story and basement building adjacent to its former factories, at the corner of Sixteenth street and Allegheny Valley Railway, Pittsburgh, and this building will be ready for occupancy in a few weeks. The company also expects to erect early this Spring a large four story and basement building on the site of one of its present factory buildings, and when this is completed, it will have an extensive and conveniently arranged plant, with sufficient capacity to keep up with any demands that may be made upon it for a good many years.

PERSONAL.

Mr. W. S. Hine, of the Wallace Electric Company, Chicago, was in New York the early part of this week.

Governor Morton has been invited to be present at the ceremony of the opening of the great plant which has been established at Niagara Falls, and to touch the button which will turn on the water that is to be delivered upon the immense turbine wheels.

The New Home of the New York Electric Equipment Company.

The business of the New York Electric Equipment Company, after a three years' career as successors to the construction, wiring and supply department of the Edison Electric Illuminating Company, has so steadily increased that the company have found it necessary to remove their headquarters from the old home at the corner of Duane and Elm streets to the large five-story building at 572-578 First avenue. The establishment at 59 Duane street, however, will be continued as a branch supply depot, for the convenience of customers in the neighborhood.

The value of the more central location and the bringing together of executive, selling, construction and manufacturing forces under one roof will be to greatly increase the facilities for the most prompt and systematic care of a large business.

THE NEW HOME OF THE NEW YORK ELECTRIC EQUIPMENT COMPANY.

Mr. Charles W. Hagar, well and favorably known for the past nine years as general manager of the Royal Electric Company, of Montreal, and a resident of Montreal for over 40 years, has been appointed special agent for the Guardian Fire and Life Assurance Company, of London, England, and has opened offices in the Board of Trade Building, Montreal. The officials and the employés of the Royal Electric Company presented to Mr. Hagar an address expressing their regret at the parting, and the assurance of continued sympathy. The address was accompanied by the gift of a magnificent desk and other office fixtures.

Address Wanted.

Will Mr. George W. Greenwood, electrician, formerly of Michigan, kindly send his present address to the ELECTRICAL REVIEW?

MOONLIGHT SCHEDULE FOR THE UNITED STATES.

[*Issued by the National Carbon Company.*]

MARCH, 1895.

Day of Mo.	Light.	Day of Mo.	Extinguish.	No. of Hours.
	H.M.		H.M.	H. M.
1	P. M. 9.20	2	A. M. 5.40	8.10
2	" 10.40	3	" 5.40	7 00
3	" 11.C0	4	" 5.40	6.40
4	" 12 00	5	" 5.40	5.40
5		6	" 5.40	3.20
6	A. M. 2.20			
7	" 3.30	7	" 5.40	2.10
8	" 3 30	8	" 5.40	2.10
9	No light.	9	No light.	
10	No light.	10	No light.	
11	No light.	11	No light.	
12	P. M. 6.10	12	P. M. 9.20	3.10
13	" 6.10	13	" 10.30	4.20
14	" 6.10	14	" 11.50	5.40
15	" 6.10	16	A. M. 1.00	6.50
16	" 6.10	17	" 2.00	7.50
17	" 6.20	18	" 3.00	8.40
18	" 6.20	19	" 4.00	9.40
19	" 6.20	20	" 4.30	10.10
20	" 6.20	21	" 5.00	10.40
21	" 6.20	22	" 5.00	10.40
22	" 6.20	23	" 5.00	10.40
23	" 6.20	24	" 5.00	10.40
24	" 6 30	25	" 5.00	10.30
25	" 6.30	26	" 5.00	10.30
26	" 6.30	27	" 5.00	10.30
27	" 7.00	28	" 5.00	10.00
28	" 8.00	29	" 5.00	9.00
29	" 9.00	30	" 4.50	7.50
30	" 10.00	31	" 4.50	6.50
31	" 11.00	April 1	" 4.50	5.50
	Total.....			205.10

The Telegraphic Historical Society.

The above-named society was organized at Washington, D. C., December 5, 1894, with the following list of officers:

President — Alonzo B. Cornell, Ithaca, N. Y.

Vice-Presidents—S. H. Kauffman, Washington, D. C.; Wm. B. Wilson, Philadelphia; Thomas D. Lockwood, Boston.

Secretary and Treasurer—Geo. C. Maynard, Washington, D. C.

Executive Council—J. H. Emerick, New York; B. F. Dillon, Jacksonville, Fla.; Wm. R. Plum, Chicago; J. Q. Mason, Tacoma, Washington.

The meeting was held in Washington and was called to order by Mr. Maynard, and Mr. Lockwood called to the chair. A general discussion relating to the aims of the society followed. The history of the electric telegraph—all publications relating to it—ocean cables, eminent telegraphers, etc., were some of the subjects discussed.

The Smithsonian Institution offered a place for telegraph relics. This was accepted with thanks. Some 250 names were enrolled, a constitution and by-laws adopted, and after electing officers the meeting adjoined.

WANTED.

A Salesman to sell Gas and Electric Shades, Arc Light Globes, Insulators, etc., to the trade. None but those of experience in this line need apply. Give references and state salary expected.

Address "GLASSWARE,"
Care ELECTRICAL REVIEW,
13 Park Row, N. Y.

Eureka Commutator Compound.

A perfect compound for Dynamos and Motors. Works on any Commutator with Copper or Carbon Brushes. Has been thoroughly tested and approved by expert engineers. LASTS LONGER and puts a finer gloss on the surface of the Commutator and Brushes than any other compound, thus increasing life of both.

A sample stick sent prepaid to any address in the United States for 75 cents. Liberal discount to the trade.

Send for price list and sample.

Eureka Compound Co.,
SIOUX FALLS, S. D.

TELEPHONE RATES.

The improved New York City Exchange Telephone Service, metallic Circuit Lines, long distance equipment, is now offered by us at rates which bring it within reach of even the most moderate users. The prices per year are as follows:

Combination Line, $80.00
Direct Line, - $120.00

And Upwards, According to Use.
No Extra Installation Charge.

The Metropolitan Telephone and Telegraph Co.,
18 CORTLANDT STREET.

FACTS. Electrically-driven machinery is modern and proper. Crocker-Wheeler apparatus is the best for this purpose, liberally proportioned, a generous factor of safety, and no trouble, if you allow us to advise you.

Crocker-Wheeler Electric Co.
Manufacturers and Electrical Engineers.

NEW YORK.
CHICAGO.
BOSTON.
PHILADELPHIA.

KINDRED INTERESTS

The Geo. L. Colgate Company, 136 Liberty street, New York, are the manufacturers of the "swinging ball" lightning arrester which has made considerable popularity for itself.

The Hart & Hegeman Manufacturing Company, Hartford, Conn., have issued catalogue "B," illustrating and describing the Hart switches. Some very tasteful and handsome flush plates for from one to eight switches are shown.

The Central Electric Company, Chicago, has issued a new 1895 edition of its splendid catalogue of electric railway materials and supplies. The cover is dark blue with a handsomely embossed design in silver. The contents cover everything, from the "Acme come-along" to "Yokes." Get a copy of it, free for the asking.

Mr. F. B. Robb, manager of the Robb Engineering Company, Limited, of Amherst, Nova Scotia, was a recent visitor to New York and favored the ELECTRICAL REVIEW with a pleasant call. Mr. Robb's company manufactures the Robb-Armstrong engine and the Monarch economical boiler, both of which are rapidly becoming popular.

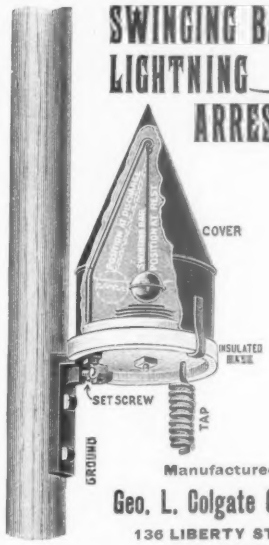
The Eureka Compound Company, 320 South Main avenue, Sioux Falls, South Dakota, are the manufacturers of a commutator compound for dynamos and motors which is made in a convenient stick form. It has been thoroughly tested by experts and is said to work to perfection on any commutator with either copper or carbon brushes. It is claimed that the compound has an unusually long life and puts a fine polish on the surface of the commutator and brushes.

The Elwell-Parker Electric Company of America, whose offices are at Cleveland, Ohio, is now building for the Cleveland City Railway Company a 1,000 horse-power direct connected railway generator, that is to be driven by a triple expansion condensing engine of the marine type, manufactured and supplied by the Globe Iron Works, of Cleveland. The speed of the generator and engines is to be 110 revolutions per minute. This combined plant is designed to work at an efficiency as high, if not higher, than anything heretofore obtained. The maximum overload capacity of this plant is to be 2,000 horse-power.

The Wallace Electric Company, 307 Dearborn street, Chicago, have just made arrangements with the Whittingham Electric Car Heating Company for the sale of their electric car heaters in the Western States. This heater is similar in appearance to a steam radiator, and consequently presents a large radiating surface. It can be supplied to give two variations of heat, half and full temperature, taking respectively three and six amperes of current. Six amperes is considered sufficient for severe weather, but the system of distribution employed with the Whittingham heater can be arranged to absorb any amount of current the street railway company is willing to expend. The heater can thus be adapted to all conditions of weather.

The Standard Underground Cable Company, of Pittsburgh, has just closed a contract with Mr. J. R. Wiley to represent them in the West with headquarters in the Rookery building, Chicago. Mr. Wiley is well-known in electrical circles, having been connected with electrical enterprises for many years, including eight years in the Metropolitan Telephone and Telegraph Company as superintendent of private lines. He is a brother of Mr. Geo. L. Wiley, who has represented the Standard Underground Cable Company in New York and the East for the past 10 years. Mr. J. R. Wiley assumes the management of the western sales department, made vacant by the untimely death of the well-known and popular Fred. E. Degenhardt, and was Mr. Degenhardt's personal friend. Mr. Wiley is a western man and his family are Chicagoans.

SWINGING BALL LIGHTNING ARRESTERS.



Manufactured by
Geo. L. Colgate Company,
136 LIBERTY STREET,
NEW YORK.

REED'S RULES The Standard Work on Conduct of Meetings.
By Hon. Thomas B. Reed,
Ex-Speaker House of Representatives.
A necessity to officers of corporations and all organized meetings.
223 Pages, cloth.
Price, 75 cents.
For sale by all booksellers, or mailed on receipt of price by
RAND, McNALLY & CO., Publishers,
61 East Ninth Street, New York.

The Consolidated Electric Storage Co.,
44 Broad Street, New York.

Sight Feed Oil Cups.
AUTOMATIC "WIPING DEVICE"
For oiling Crank and Cross-head Pins.
WM. H. WILKINSON,
352 Atlantic Ave., Boston, Mass.

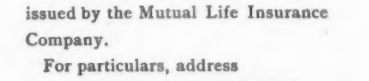
ELECTRICITY
Mechanics; Mechanical Drawing; Architecture; Architectural Drawing and Designing; Masonry; Carpentry and Joinery; Ornamental and Structural Iron Work; Steam Engineering (Stationary, Locomotive or Marine); Railroad Engineering; Bridge Engineering; Municipal Engineering; Plumbing and Heating; Coal and Metal Mining; Prospecting, and the English Branches. Until further notice experimental apparatus will be furnished *free* to students. Send for Free Circular, stating the subject you wish to study, to
THE INTERNATIONAL CORRESPONDENCE SCHOOLS, Scranton, Pa.

GEO. H. BENJAMIN,
45 BROADWAY, NEW YORK,
PATENTS AND PATENT LAW.

FORÉE BAIN,
ELECTRICAL AND MECHANICAL ENGINEER,
SUITE 1657, 1658 AND 1659
MONADNOCK BLDG., CHICAGO.

NOTICE TO CABLE MANUFACTURERS
—AND—
ELECTRICAL CONTRACTORS.
Sealed proposals will be received by the Construction Committee of the Underground System of the Police and Fire Alarm Telegraph and Police Patrol until 12 o'clock noon, Friday, March 1, 1895, for the complete electrical equipment of the electrical subways of the Police and Fire Alarm Telegraph System of Baltimore City.
The equipment to include 130,000 feet, more or less, of bunched cables, from two to 80 conductors, drawing in, splicing and connecting the same, pole terminal boxes, house terminal boxes, cable terminals, test boards, lightning arresters, etc.
Copies of the agreement and specifications, under which the work is to be performed, can be obtained at the office of the engineer by depositing $5, which will be returned when proposals are received.
Proposals should be addressed to the committee, and shall contain a certified check for $500, made payable to the Mayor and City Council of Baltimore.
Right is reserved to reject any and all bids.
CONSTRUCTION COMMITTEE OF THE UNDERGROUND SYSTEM OF THE POLICE AND FIRE ALARM TELEGRAPH AND POLICE PATROL OF BALTIMORE CITY.
NICHOLAS S. HILL, JR., Engineer.
508 Equitable Building, Baltimore, Md.

MAGNETO AND BATTERY
TELEPHONES AND SWITCHBOARDS.
C. F. DUNDERDALE,
42 West Quincy St., Chicago, Ill.

PLACE YOUR LIGHT RIGHT
WHERE YOU WANT IT.

Catalogue FREE.
FARIES' PATENT UNIVERSAL LAMP HOLDER,
Several Styles and Sizes.
Ask your dealer for them or write direct to
FARIES M'F'G CO., Decatur, ILL.

CLEVELAND CONVENTION
OF THE
National Electric Light Association.
The attention of delegates and others attending above Convention is invited to the superior service offered by the PENNSYLVANIA RAILROAD between NEW YORK and CLEVELAND. Through Pullman vestibule sleeping cars, with dining car service between New York and Philadelphia, leave New York 6 P. M. daily, arriving at Cleveland 11:15 next morning. Tickets and reservation of sleeping car space at all Pennsylvania ticket offices.

WOVEN WIRE BRUSHES.
The Belknap Motor Co., of Portland, Maine, are the patentees and manufacturers of the best woven wire commutator brush on the market.

ELECTRO-MAGNETS
— FOR ALL —
ELECTRICAL PURPOSES.
The Varley Duplex Magnet Co.,
64 CORTLANDT ST., N. Y.

ROYCE & MAREAN,
DEALERS IN
Electrical Supplies,
WASHINGTON, D. C.

W. R. OSTRANDER & CO.
No. 204 FULTON ST., NEW YORK.
Manufacturers of
SPEAKING TUBES, WHISTLES, ANNUNCIATORS.
Electric and Mechanical Bells.
FACTORY,
De Kalb Ave.,
BROOKLYN.

Send for Illustrated Catalogue.

A Suggestion That Everyone Should Heed.
Put your savings in an investment exempt from fluctuation in value and beyond the reach of commercial disaster.
There are no receiverships, reorganizations or repudiations possible in the promise to pay of the *Mutual Life Insurance Company.*
The income of the Mutual last year was $41,953,145.68; its outstanding insurance $708,692,552.40, and its assets $186,707,680.14.
Every desirable form of policy is issued by the Mutual Life Insurance Company.
For particulars, address
WALTER H. COOKE,
32 Liberty Street,
NEW YORK CITY.